Educational Technology Review & Recommend

By SERRC: Alaska's Educational Resource Center
Primary Author: Ryan Stanley, Director of Technology
Prepared for the Juneau School District
October 2008 – January 2009

SERRC Alaska's Educational Resource Center
Alaska's Source for Educational Solutions
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Executive Summary

A significant amount of technology is in use across the Juneau School District. Students have more access to computers than many fellow Alaskan schools, and significantly more than other K-12 students nation wide.

Beyond the ratio of computers to students it is clear that the district is trailing behind the needs of today's modern workplace. Outside of school, students enjoy proficiency in technology which businesses are quickly realizing will define the workplace of tomorrow: social networking, online community, asynchronous collaboration. Yet, the most widely used examples of these tools are not integrated into Juneau's classrooms or are blocked by the district's internet access policy.

In schools without coursework involving the modern tools they deem relevant, students easily lose interest.

Efforts to upgrade classroom and infrastructure technology and practice are hampered by budget and organizational challenges. Lacking a Technology Coordinator, the district has little accountability by way of technology spending, and little capacity for long term educational technology planning.

The same budgets accustomed to paying for pencils and paper won't cover ongoing computer replacement costs. The majority of new technology funding comes from school renovation funds which are not recurring and don't allow the district to replace technology on a regular cycle. Other funding sources, including grants, pay for particular items and are limited in their scope. Purchases are made in isolation and aren't part of a strategic vision.

In an effort to address these needs the Juneau School District has commissioned this *Educational Technology Review and Recommend*.

Acronyms and Legend

Lengthy and often repeated phrases are abbreviated as follows:

General	*School/Site Abbreviations*
EL: Elementary	AB: Auke Bay EL
MS: Middle School	DZ: Dzantik'i Heeni MS
HS: High School	FD: Floyd Dryden MS
	GS: Gastineau EL
Department/Group Abbreviations	GV: Glacier Valley EL
IT: District IT	HBC: Homebridge Correspondence
OIS: Office of Instructional Services	HBV: Harborview EL
IST: Instructional Support Team	JC: Juneau Community Charter School
MDDC: Marie Drake Data Center	JD: Juneau Douglas HS
NSC: Network Systems Center	JYC: Johnson Youth Center
AST: Application Support Team	MR: Mendenhall River EL
DTC: District Technology Committee	MiMo: Miller House / Montana Creek
STC: School Technology Committee	RB: Riverbend EL
	TM: Thunder Mountain HS
Technical Jargon	YK: Yakoosge HS
SSH: Remote command interface (UNIX)	DO: District Office
OD: Username and password directory	Maint: District Maintenance
WAN: Wide Area Network	JSD: Juneau School District
VLAN: Virtual Local Area Network	
UPS: Battery power supply	
RAID: Provides data redundancy.	
SAN: Storage Area Network	
NAS: Network Attached Storage	
VM: Virtual Machine	

Objectives and Methods

The following document has three primary objections:

1. To provide an accurate assessment of current educational and infrastructure technology status and practice district wide;
2. To design feasible recommendations based on exemplary practice and input from all stakeholders;
3. To provide a research based matrix detailing a five year plan of milestones, activities, and costs for implementing recommendations.

A number of both empirical and quantitative methods were employed during the course of research. Quantitative data was gathered from: electronic survey, collation of existing documentation, physical/observed inventory, and results from basic network/bandwidth tests. Empirical information was gathered through: observation, interview, and general research. Throughout gathering and analysis (Oct. 26 to Dec. 22) our team performed physical walk-through and inventory of all nineteen schools and district offices,[1] interviewed 59 staff, analyzed 178 survey responses,[2] performed analysis of existing technical and organizational systems, spoke with various comparable school districts and applicable solution providers, and performed general computer and network analyses. A complete list of research activities is detailed in *Appendix A: Components of Research*.

District Overview

The Juneau School District serves nearly 5000 students throughout seventeen locations including three high schools, two middle schools, six elementary schools, one elementary charter, one correspondence, one K-8 Montessori program, and three classrooms in youth group homes.

The JSD organizational structure as observed in this review is shown below.[3]

Executive direction occurs at the cabinet level (blue) with input from and delegation to mid management (green) and various formal and informal organizational groups (red). The Board of Education plays an active role in long-term goals.[4]

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1. Attachments > "Inventory.xlsx"
2. Attachments > "JSDRAWSurveyResults.xls"
3. Attachments > "JSD-OrganizationalChart-FY2009" This chart provided upon request and with the caveat that it is currently under revision.
4. Attachments > "JSD-Board Goals 2008-2013.pdf"

Integration Assessment

To gauge technology integration a rubric was devised to score each school by various criteria, including:

- Coordinated instruction;
- Accessibility to multimedia;
- Use of multimedia in non-technology classes;
- Librarian involvement;
- Site technician involvement;
- Classroom integration;
- Document camera, SMART board, specialized integration technology in use;
- Technology leadership;
- Student::Computer ratio;
- Technology age and status.

See *Attachments > "IntegrationRubric.xlsx*" for full detail and scores.

Educational Technology Planning

The twenty member District Technology Committee (DTC)[5] meets monthly and makes advisory recommendations without budget or executive ability. The committee consists of staff volunteers representing some, but not all, District schools. Of the twenty members, four are from the six elementary schools, five from three high schools, six from the two middle schools, one from OIS, two from middle management, and two from upper management. Four schools have no representative on the district Technology Committee.[6]

In 2007-2008 the technology committee developed a state-mandated Technology Plan[7]. The plan provides an overview of current technology integration and the steps needed to maintain and improve both the infrastructure and a number of existing technology projects. The State of Alaska approved the plan, qualifying the district for a 55% E-Rate reimbursement on telephone and bandwidth bills.[8]

The Technology Plan contains action steps for milestones without assignments of responsibility. The committee does not have the organizational authority to assign tasks to staff or departments and there is no person whose job description requires supervising the implementation of technology plan action steps.

In 2003, a district committee produced a document titled *Technology Curriculum*, which outlines technology standards per grade level.[9] The document provides specific benchmarks but does not include sample lessons for teachers. One benchmark requires a third grade student to

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5. JSD Tech Committee's "wikispaces": http://is.gd/eQkc

6. YK, AB, GS, MiMo/JYC

7. Attachments > "JSD Technology Plan 2008-2011.pdf"

8. The district, due to it's school-lunch numbers, does not qualify for Tier 3 or Tier 4 E-Rate reimbursements (internal connections and basic maintenance).

9. Attachments > "JSD-Technology_Curriculum_2003.pdf"

"produce multimedia presentations with text (both written and imported), graphics, and sound" yet from interviews and survey results many teachers are unaware how to produce a multimedia presentation themselves.

The document also states:

> "Each site will have a technology committee, responsible for updating the site technology plan in compliance with the district approved technology plan and the district technology curriculum document. the district will assign a central office administrative staff member to review site technology plans and approve purchases of technology designed to implement the curriculum and technology plan."

During the course of our review we did not find per school technology committees. There also is no district level individual assigned with the task of reviewing per school educational technology plans.

Long-term educational and infrastructure technology plans are discussed at the committee level and in discrete pockets around the district without overall coordination.

Since 2003, the district has not funded a position of Technology Coordinator. This is a traditional position in modern school districts whose job is to not only coordinate technology infrastructure and integration, but to maintain the collaborated vision.

Integration Budgeting

There is no budget devoted to sustaining and developing coordinated technology integration. Funding for particular integrations comes from one time sources including grants, renovations, fund-raisers, and program budgets.

For example, for many years the district partnered with a local television station to broadcast on Channel 6 but the resource has gone largely undeveloped. The initiative to collaborate between schools and make earnest use of Channel 6 is not supported by a sustained budget but could benefit from a number of investments. Maintenance of equipment, further equipment purchases, planning and policies regarding student broadcasting, coordination of curriculum inter school, dedication of physical space, standards alignment, cost/benefit analysis, and other program considerations are undefined and without overall coordination.

A number of staff in schools make technology planning and coordination efforts but are stymied either by the comparatively low school operating budgets or the lack of organizational support. Those schools that choose to prioritize technology in their operating budgets have a higher degree of integration and coordination between staff and coursework.

Technology Solutions Development

The network and server infrastructure is designed and maintained by the district Information Technology department. Many network services are selected without input from the educators

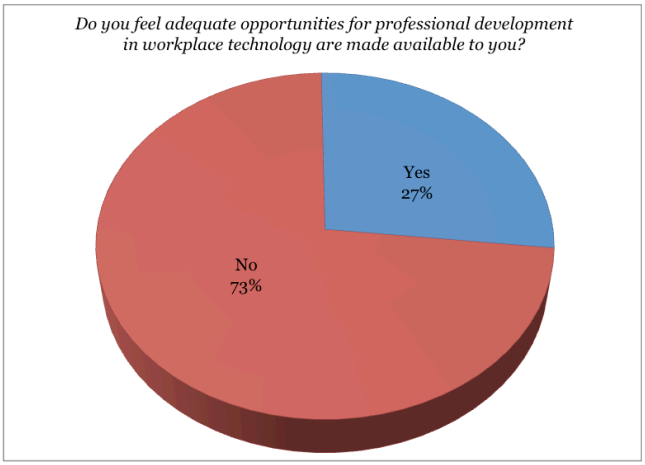
who use them. Internet content filter, email programs, configuration of file sharing and collaboration resources, website technologies, and many other Wide Area Network services are selected and implemented by the district IT staff.

Conversely, many educational solutions that require technology are researched, developed, and purchased by the instructional department or schools without full involvement of District IT.

Neither the instructional or IT departments coordinate in a consistent manner.

Professional Development

Teachers in the district express a desire for higher quality professional development. Regular inservices, when they cover technology, are often not perceived as meaningful by teachers. Survey response shows 73% of staff say the district does not provide adequate professional development.



Through interviews and surveys, teachers shared their preferences regarding professional development. The following main points are an aggregate of teacher comments:

- Content Specific: Teachers remarked that per school training increases team building but does not expose attendees to specifics that enable them to truly integrate the tools. Instead, teachers prefer content specific trainings that address methods for integration in hands-on practice. Example: show all the biology teachers how to plug the USB microscope into a projector for in-class observation and demonstration.

- Just In Time: Teachers express that technology is not essential to education, and when they can't figure something out or get help within 10 minutes, they will move on.

- One-On-One. In addition to when they want it, surveys show that teachers prefer one on one trainings that include guided practice.

- Accessible Practice: Teachers express that trainings often aren't sufficiently hands-on and there aren't enough tools to go around. Frequently, deployment of technology does not coincide with training. For example, Instructional Support Teams were given document cameras and SMART boards but the trainings and delivery of the equipment were weeks apart.

- On The Clock: Teachers want to keep their evenings and weekends free for personal time and would prefer trainings be held during their regular work hours.

A question was posed to all management regarding the feasibility of professional development in an increasingly technological age. The cost for substitutes, in-services, and trainers is significant. When asked if the district should include all teachers or only those that express technology interest/aptitude, all principals agreed that trainings must be initially focused on staff that want them, but must be available to all staff equitably.

Teachers generally indicated that if the district wants them to integrate certain tools, they have to pay them to learn the techniques.

Technology Standards

A 2002 assessment[10] of the technology plan noted the district's core curriculum did not address many key areas in information literacy. The report summarized the extent of technology in core Language Arts:

> "Word-processing is mentioned at each of the secondary levels. Also in the writing section, at the high school level, mention is made of using the Internet to research information, using the file server to organize information, and the need for critical evaluation of web sites."

Analysis of the secondary core Language Arts standards dated August 2007 shows no change in regards to information technology.[11]

the district Technology Standards posted on the website are dated 2003 and address proficiency in various technologies, including online collaboration: "express/exchange ideas, information, and images electronically." No evidence was found to indicate that these standards are integrated into the district's core curriculum or across classrooms.

Many non-technology teachers consider technology standards optional. Tech forward teachers are aware of, and employ at their own behest, more contemporary standards including the National Education Technology Standards (NETS), which are very clear about how important modern online collaboration skills are for students: "interact, collaborate, and publish with peers, experts, or others employing a variety of digital environments and media."[12]

Teachers who do not employ district or national standards cite one of two reasons: 1) they can not depend on technology that often is not working, or 2) they have not received appropriate professional development.

Many teachers expressed the opinion that their students know more than they do about computers, the internet, and handheld devices.

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10. Attachments >"Fall 2002 JSD Tech Plan Report.doc"

11. Attachments > "Sec_LangArts_core.pdf"

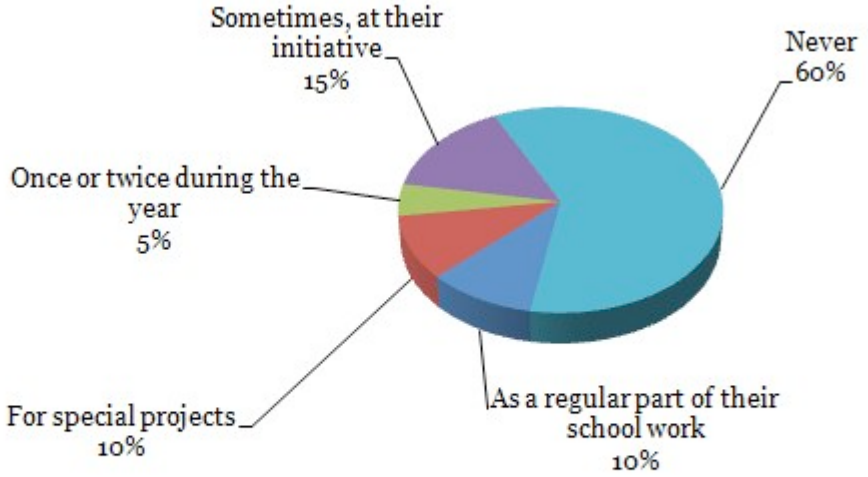
12. *http://www.iste.org/NETS/*

Among schools, there is no consistent curriculum for teaching basic technology. Students learn different techniques depending on the skills of their teachers.

One of the district's technology standards for grades six through eight reads:

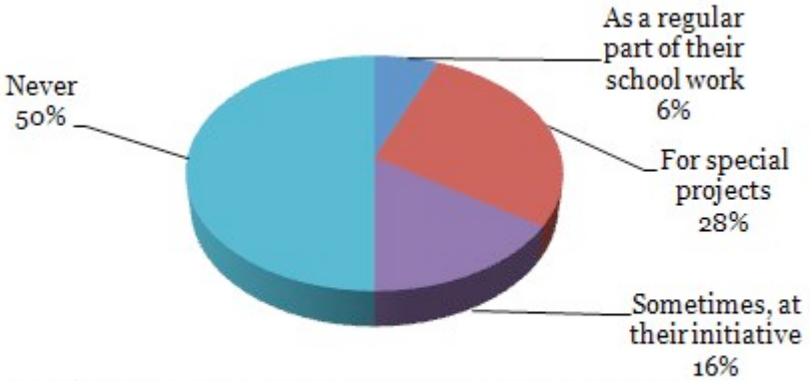
> "Collaborative work with other students in the district or worldwide using email/telecommunications to solve a problem."

Survey results of sixth through eighth grade teachers show that 60% of their students "never" collaborate online as part of their school work:



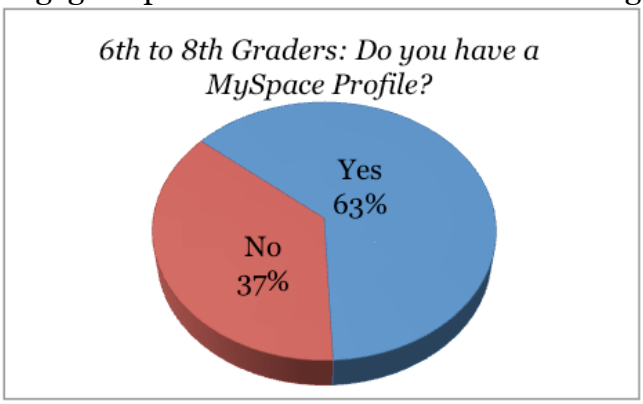
(Grades 6th-8th: Students in my class participate in a cooperative learning project in an online learning community or interactive website)

The response of ninth through twelfth grade teachers showed that integration of online learning does not increase in the secondary:

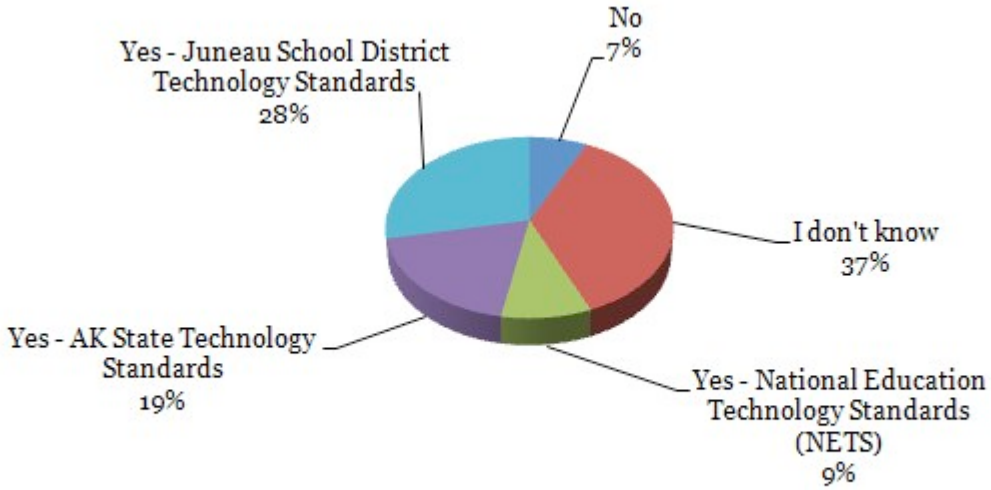


(Grades 9th-12th: Students in my class prepare and publish coursework in an online, collaborative environment)

Yet, when surveyed directly, 63% of the district's sixth to twelfth grade students replied they do engage in personal online collaboration using social networking outside of school.



District core and technology standards do not satisfactorily reflect current information technology trends in the workplace. Yet, students are nevertheless engaging in this technology outside of school. Moreover, survey results showed that 44% of teachers in the district either do not know or do not adhere to any technology standards.



All Teachers: Does your curriculum integrate with any published educational technology standards?

It is important to note that the Juneau School District is not alone in Alaska regarding modern technology standards. Until the year 2007, the State of Alaska did not publish technology standards for teachers or administrators, and still does not include technology in teacher or administrator certification or re-certification requirements.[13] In addition, staff at the Alaska Department of Education agree that the currently adopted standards are outdated.[14]

13. Source: http://www.edweek.org/media/ew/tc/2007/AK_STR2007.pdf

14. Source: Alaska Dept. of Education, Educational Technology.

Inventory

When performing tours of all district buildings, the team documented all physically accessible technology.[15] Items were categorized according to the following criteria:

- Age Factor[16] (years old): 1-3 (New), 3-6 (End of Life), 7+ (Decommission);
- Assignment: Student, Staff, or Teacher;
- Type: Computer, Printer, Projector, etc.

Technology over six years of age is classified as "decommission" due to reliability and incompatibility. Technology three to six years of age is classified as End of Life (EoL)

The following table shows computer populations district wide:

Student-use computers (Decommission)	555
Student-use computers (New, EoL)	1805
Teacher-use computers (Decommission)	65
Teacher-use computers (New, EoL)	515
Staff-use computers (Decommission)	62
Staff-use computers (New, EoL)	177

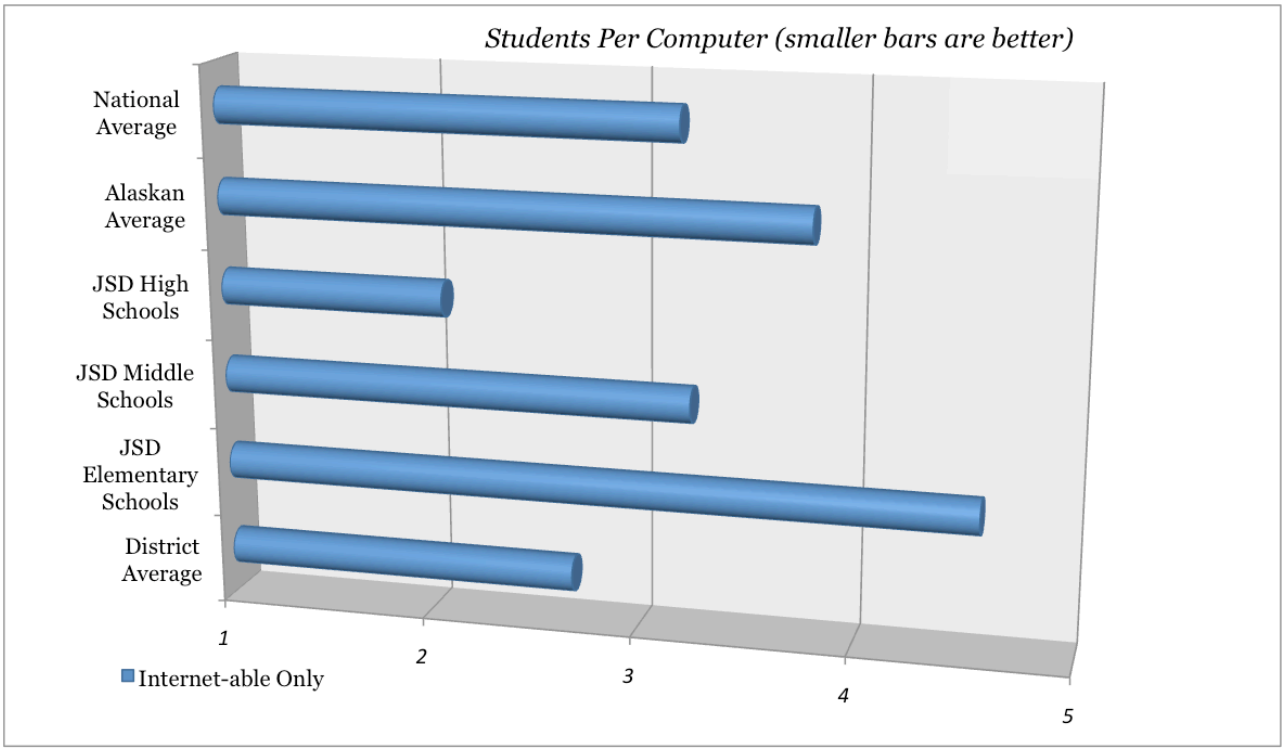
Computer to student ratios for grade levels in the district, Alaska, and nation-wide are shown in the following table and chart:[17]

Grade Level	Students Per Computer (including non-Internet)	Students Per Computer (Internet-able only)
District Average	2.06	2.69
JSD Elementary Schools (AB, GS, JC, MR, GV, HBV)	3.56	4.57
JSD Middle Schools (DZ, FD)	2.02	3.25
JSD High Schools (JD, TM, YK, MiMo, JYC)	1.69	2.08
Alaskan Average	n/a	3.8
National Average	n/a	3.2

15. Attachments > "Inventory.xlsx"

16. Technology ages, when not known, were "best guess".

17. Source: http://www.edweek.org/media/ew/tc/2007/AK_STR2007.pdf

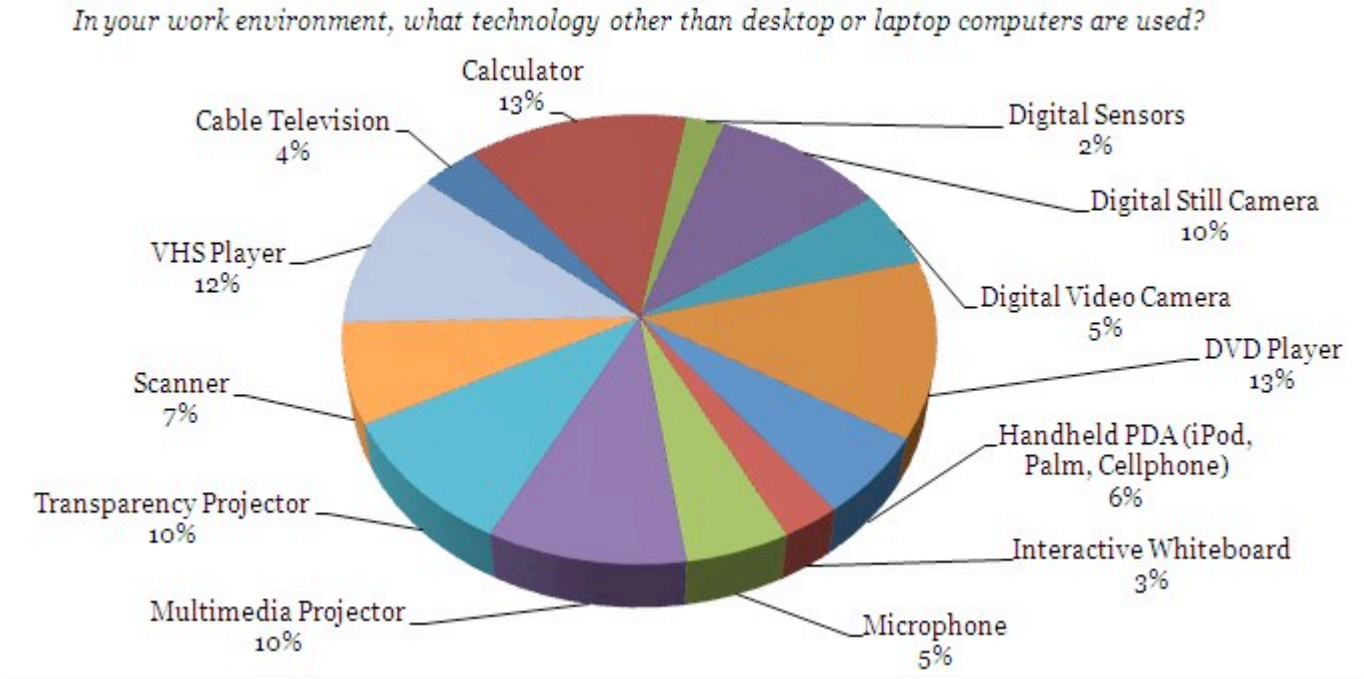


The following table shows quantities for non computer technology:

Projector or large-format monitor	137
Copy machine	37
Video camera or accessory	59
Document camera	58
Hand held devices	69
Specialized Classroom Tech[1]	70
Interactive Display[2]	27
Other (No Category)[3]	62
Specialized Software / Websites[1]	132

[1] Includes all USB microscopes, Flashmaster math devices, scientific probes, and other classroom or curriculum specific tools as well as particular websites and software.
[2] Includes board and tablet models of various manufacture including Smart and Interwrite.
[3] Includes various items like TVs, microfiche, UPS, fax machines.

Survey results show a large number of non computer tools are used in classrooms across the district:



A standard set of software was found on all computers and includes: All The Right Type (EL and MS only), Office Suite (Microsoft or Apple, sometimes both), Web Browser (Internet Explorer, Safari, or Firefox). All networked computers have Internet and printer access.

A large number of websites and software titles are employed by teachers across the district, but no central inventory exists. Survey results collected a large, but partial list:

Website	Desktop Software	Web-Software
Tumble Books	Picasa	Google Earth
Google Apps	Torque	iTunes
BreadNet	ArcMap	iChat
YouTube	DNAi	Adium
Mr. Donn's	Dreamweaver	
SciLinks	Collaborate	
UCMP	iMovie	
Starfall	Inspiration	
Quest	Garage Band	
ILike2Learn	Comic Life	
CitationMachine	Power Game	
EasyBib	LabPro	
Digital Pipeline	Vernier	
News (various)	Data Studio	
AKCIS	MultiSim	
YoungMoney	Inventor	
CollegeBoard	iWeb	
CISAlaska	Apple Remote Desktop	
Virtual Stock Exchange		

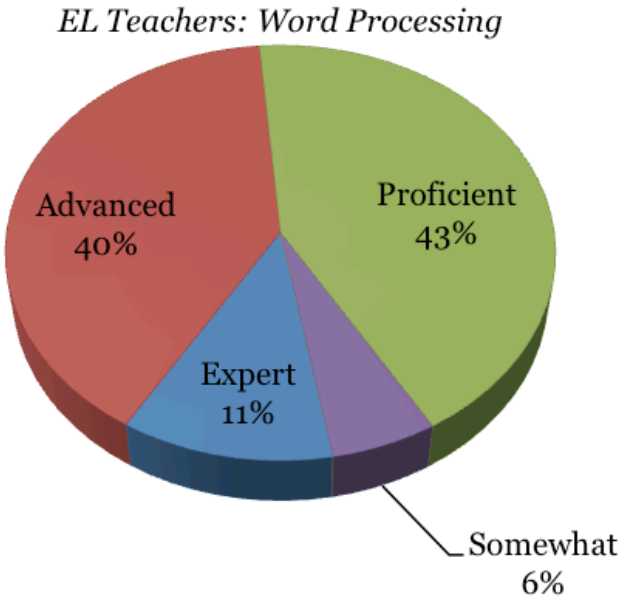
Elementary Integration

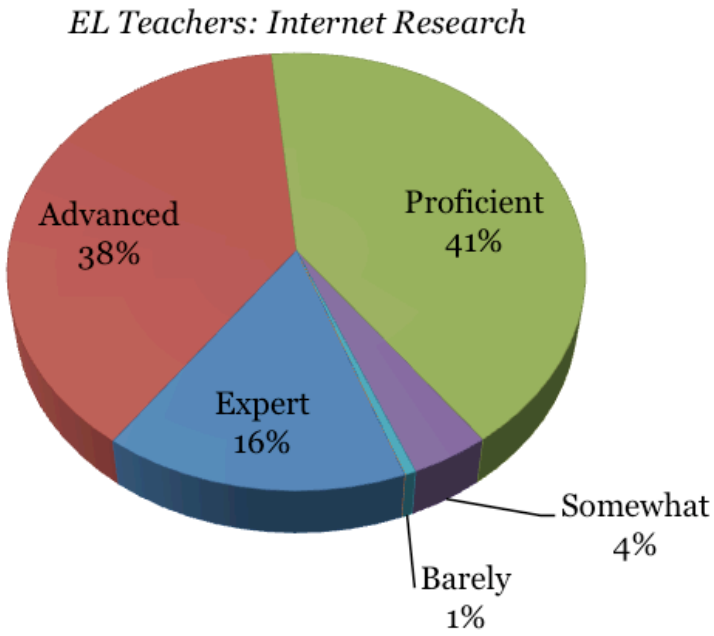
Technology in the district's elementary schools is pervasive yet inconsistently used. Students readily have access to computer and internet technology. Each classroom has one to three computers. Computers from room to room have different software versions installed, different internet plugins, different configurations, and different operating system versions. The majority of the district's non internet computers are found in the elementaries.

Elementary teachers employ a broad range of educational technology and resources to operate their curriculum. Specialized websites to facilitate finding information on the Internet, websites that deliver educational E-Books, and pre-made online scavenger hunt lessons are a few of the many tools elementary teachers employ.

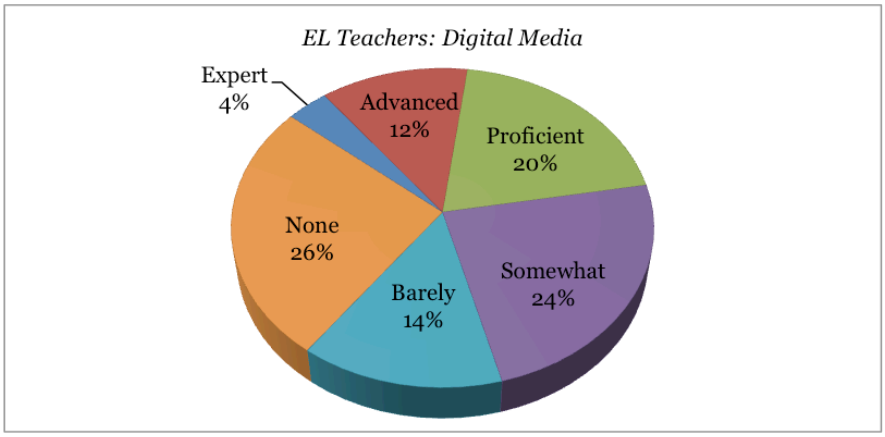
Students in first and second grade begin learning keyboarding and word processing to prepare and print documents, as well as basic internet research. These tools are integrated in various content areas in various ways, depending on assignment and teacher preference.

According to state and national standards, fifth grade students should be proficient in word processing, basic internet use including collaborating with others, and use of multiple types of media in their work. Survey results show that over 80% of the district's elementary teachers consider themselves proficient or advanced in word processing and internet:





For proficiency in digital media, 32% of elementary teachers considered themselves proficient or advanced:



Results indicate that elementary teachers have adequate fundamental technology skills for the standards they should be teaching. Yet, across classrooms in the same school, students learn how to use technology tools differently depending on their teacher.

For example, a principal performing in-class observation watched a teacher show a student how to center text in Microsoft Word by placing the cursor at the beginning of the text and pushing the tab key enough times so the text looked centered. In that same school during a separate observation the principal witnessed a teacher show a student how to center by selecting the text and pushing the proper format button.

Lessons for fundamental technology are not coordinated in elementary schools. A teacher with understanding of a particular technology integrates his or her unique expertise into lessons and passes that on to students. From one classroom to the next, in the same school, a student may learn different techniques, uses, and habits regarding technology tools. As a result, skill sets from student to student are highly variable.

Librarians in the elementary schools work half time and play little role in technology curriculum development.[18] When asked, all elementary librarians expressed an interest in becoming more involved in teaching information technology literacy.

Site technicians in the elementary schools are not certified teachers and are not involved in curricular design.[19]

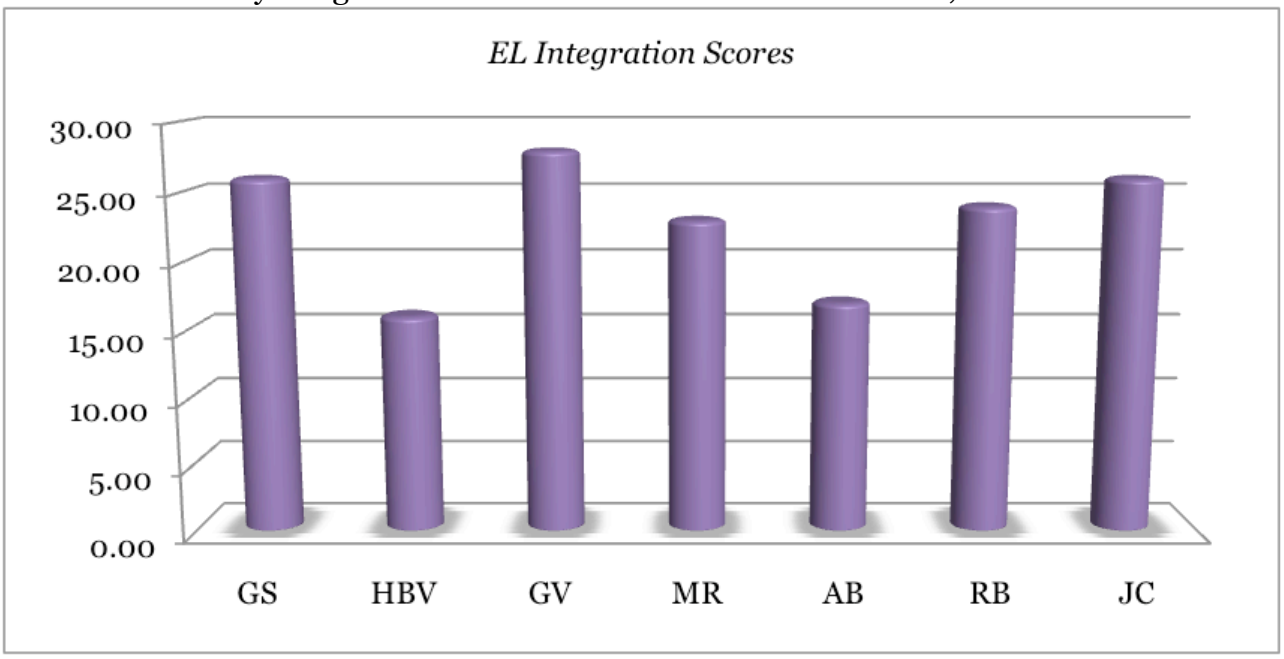
In addition, the following observations regarding elementary technology integration were made:

- Schools with a technology forward teacher or principal have a higher level of coordinated integration.
- The Glacier Valley school showed a higher than average level of technology use and was the only elementary school to successfully employ a mobile laptop lab.

18. Exception: Glacier Valley, the librarian is very involved in working with teachers and students to operate "digital story-telling" lessons.

19. Exception: Gastineau, the site technician designs and deploys technology lessons.

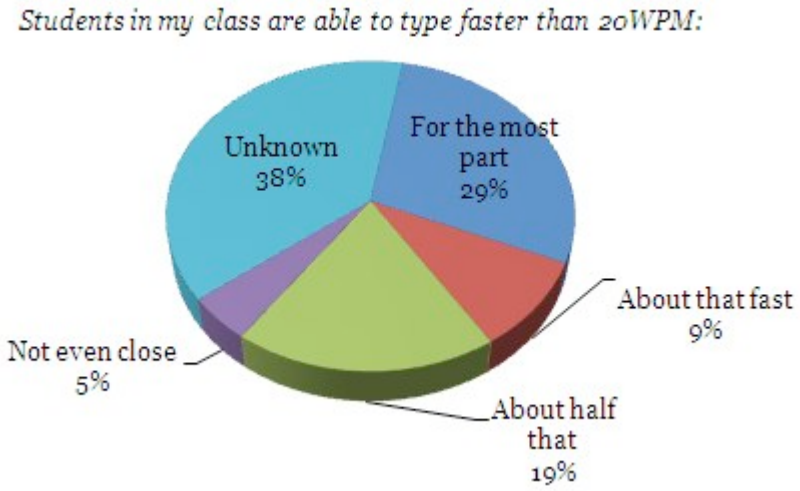
Overall elementary integration was scored on a standardized rubric, results shown below:



See *Attachments* > *"IntegrationRubric.xlsx"* for full detail and scores.

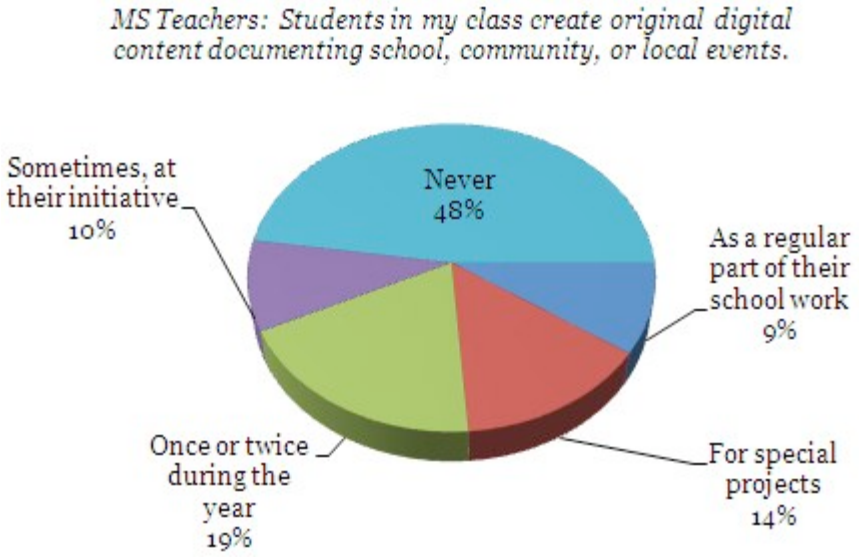
Middle School Integration

District technology standards indicate that by sixth grade, students should be typing at least 30 words per minute. All elementary and middle schools use the All the Right Type keyboarding software. In the middle schools, 38% of teachers don't know how many WPM their students can type. Nearly 50% believe that their students type at about or below 20WPM, indicating that student typing skills are generally below what they should be.



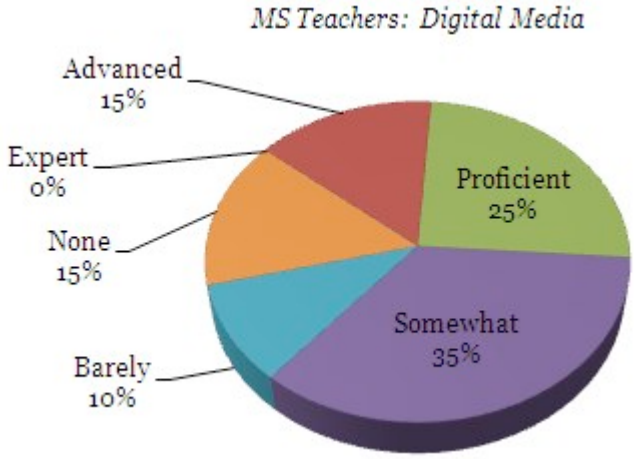
Each middle school has a technology teacher whose classroom is also a computer lab. Student fundamental technology skills are more consistent than at the elementary schools, but as the

data below shows, classroom teachers in the middle schools do not integrate technology in non-technology content areas.



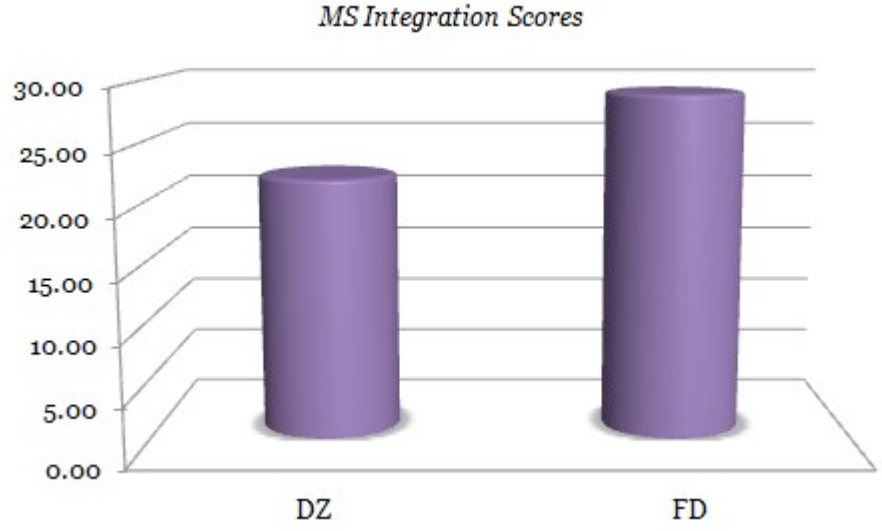
In both middle schools, students go to the computer lab as an elective where they indeed create original digital content, yet these skills are not applied in non-technology content areas. Both schools have significant digital video resources, including student produced news and videos.

75% of middle school teachers believe they are "somewhat" or above proficient in digital media, indicating the lack of per-content area integration is not due to teacher skills.



The Floyd Dryden middle school was found to have more classroom technology for teachers and students. Every classroom has a multimedia projector, many teachers use "smart" tablets, and school leadership emphasizes the importance of technology and prioritizes it in the yearly building budget.

Overall middle school integration was scored on a standardized rubric, results shown below:



See Attachments > "IntegrationRubric.xlsx" for full detail and scores.

High School Integration

The two main high schools are comparatively identical with regards to technology support and integration. site technicians are too busy to be preemptive and are generally on their own for determining the best way to administer technology in the building. There is little coordinated technology integration. Students attend elective courses to learn particular technologies, and teachers integrate technology based on their own skills or creativity.

In the Juneau Douglas High School (JDHS) a significant amount of various technology exists. Video production, scientific sensors, CAD, advanced document processing, digital media, digital story telling, a broad range of internet tools, and a fledgling 1-to-1 laptop program provide many options for students. The library has an advanced circulation system that is shared district wide and is being expanded to include equipment checkout for teachers to borrow projectors, laptops, and other tools.

Teachers cite internet speeds at JDHS as the main hindrance to classroom productivity, seconded by lack of technology coordination.

As elsewhere in the district solutions of a large scale occur from the top down,[20] and only rarely do teacher ideas turn into actual implementations.[21] Project Lead The Way (PLTW), a notable integration, was brought to the district through a grant award rather than from the bottom up by way of teacher inspiration. While content and merit of the program is very exciting it remains to

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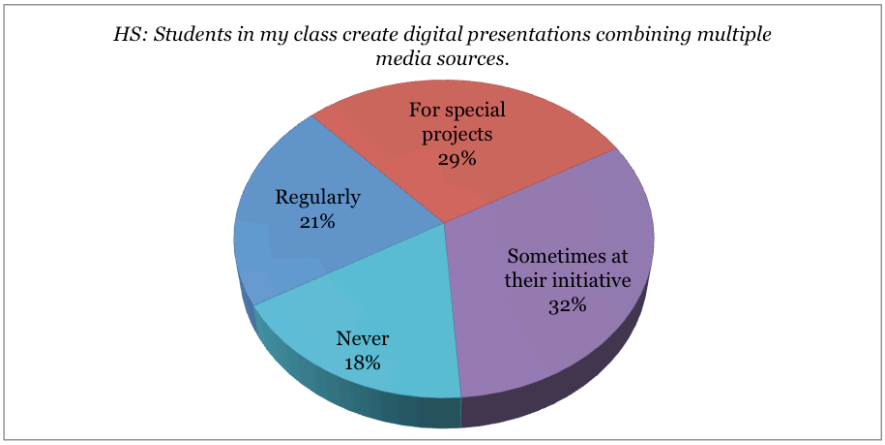
20. Latest Example: Project Lead The Way

21. Example: Channel 6

be seen what any return on investment will be. As part of PLTW the school bought a $20,000 "rapid prototyping" printer of the type used by engineering and architectural firms. When asked if their students will be able to use this technology to excel into engineering fields, teachers replied they view the resource more as a way of gaining student excitement and hopefully keeping them in school.

The student to technology ratios in all high schools is very high, comparatively, yet students still do not meet basic technology standards. 21% of surveyed teachers said that students "regularly" create mixed-media presentations using tools like PowerPoint.



At the time of this writing Thunder Mountain High School (TMHS) teachers are completing the school's first semester of operation, so very little in-depth integration is occurring. Planning for school technology seems to have ended at making the infrastructure operational. Many teachers express that they are simply trying to get up to speed with the environment, students, and their classes.

The wired network infrastructure at TMHS is cutting edge. Operating at speeds far higher than any other in the district the network is, according to its designer and implementor, the "best in Juneau."[22] Typical schools use fiber optics to extend long network distances through building wings, whereas at TMHS each classroom has it's own fiber optic connection. The cost for fiber network hardware in each classroom is significantly higher than standard Category 6 ethernet.

The potential of the advanced wired network is largely unrealized and without specific plans to make use of it. No classrooms have student use computers installed. There are no large files copied over the network and insufficient server storage to house multimedia podcasts or streaming video. There are 80 wireless student laptops that can be checked-out by teachers for classroom use, but there is no system for their check-out so the laptops are mostly unused.

The school has two tiered computer labs, but one is without any computers. One classroom has a number of iMac computers in it, but they are positioned in the center of the room where ethernet ports don't exist, so the computers are configured to access the network wirelessly.

The wireless networks in TMHS and JDHS are recently installed and nearly identical in configuration and manufacture.

Each classroom at TMHS has a projector mounted to the ceiling and a sound system with wireless microphone. Most projectors get daily use but teachers report training in using the other multimedia elements was unsatisfactory. Each room has a wireless infrared microphone but few, if any, are used in actual classroom application. Each room has speakers in the ceiling

22. Source: Jeffus and Williams

and an audio amplifier, but the wiring schematic is such that sound from the computer will only come through the speakers while the projector is turned on.

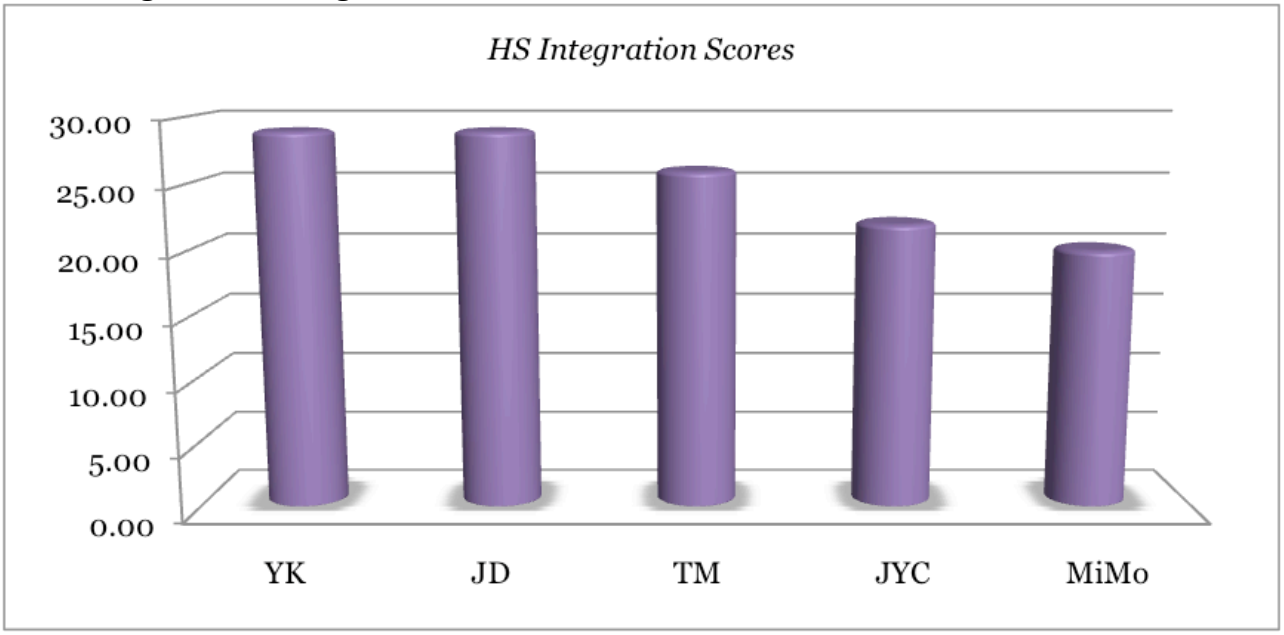
A laptop 1-to-1 project is nearing launch in both high-schools, but there is no curriculum for it nor any clear supervision.[23] Staff don't know when the laptops will be deployed, how they will be maintained, or what types of activities they'll be employed for.

In the alternative high school, Yakoosge, a laptop 1-to-1 project is in its third year. Students who qualify can take their computer home while those that don't can check out their computer during the school day. Teachers and school leadership speak highly of the program. Students use their laptops in nearly every class for producing documents, performing research, and accomplishing school work. Teachers appreciate how the student laptops allow them to differentiate instruction across content areas while at the same time giving students a standard platform to organize and aggregate their work.

Yakoosge staff were unable to produce data demonstrating the effect of the 1-to-1 laptop program. Alaska Department of Education records don't include Yakoosge in AYP.[24]

The district maintains three classrooms in facilities for troubled youth. Johnson Youth Center, Miller House, and Montana Creek provide basic instruction allowing students to pursue their diploma. The Johnson Youth Center has a good amount of modern computer technology, sufficient to accomplish the needs of the classroom. The Miller and Montana Creek classrooms have sparse technology in varying states of disrepair. None of the facilities have independent internet content filter control, nor do they employ specialized technology like keystroke logs to assist students in remaining academically productive.

Overall high school integration was scored on a standardized rubric, results shown below:



See *Attachments > "IntegrationRubric.xlsx"* for full detail and scores.

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23. During the course of this project the district was advertising to hire a part-time laptop technician to support the 1-to-1 initiative.

24. Attachments > "JSD AYP Workbook.pdf"

Infrastructure Assessment

District wide Technology Operations & Support

Most schools have a full-time site-based technician. When users need technical support, they ask their local site technician. If unable to resolve the issue it is escalated to the district IT group (through email, telephone, or trouble-ticket). Staff and teachers do not contact District IT directly for support with the exception of those schools without their own site technician: JYC, MiMo, DO, YK, JC.

District IT maintains mission critical network and server infrastructure systems, as well as provides technical support to school staff. The per site technicians are generally entry-level and able to handle basic application level issues but not more complicated technical problems or configurations.[25]

With the exception of the supervisor and computer network technician, the other four District IT staff share the same job description, as do all of the site technicians.[26]

Each site technician is hired and supervised by the building principal, contributing to an overall lack of district wide coordination. Across schools, site technician skill sets, interests, and duties vary considerably. In addition to regular technical support, site technicians often perform recess duty, help students get on buses, and various other "as assigned" tasks. The job description doesn't require a teaching certificate, but does state the individual will "plan lab activities for students, monitor student progress."

One of the ten site technicians is actively involved in planning activities and monitoring progress. The remainder view their job as strictly keeping the technology functional.[27]

There is no consistent configuration to computers, wireless, or software around the district, nor is there any organizational mechanism to implement such. As a result District IT staff are unable to "remote" into all computers across the district, even though the network topology is configured to allow all traffic to/from all sites. Instead, teachers needing technology support have to wait for one of the district IT staff to dispatch to the school which, depending on availability and priority, can take days.

In general, the division of responsibility between District IT and site technicians lacks definition, especially in regard to management of particular "physical layer" devices such as network printers, Ethernet switches, wireless access points, and other network devices. Responsibility varies per site, depending on site technician capabilities. In some schools, District IT takes a very active role attending to any number of issues; in others IT is called upon only rarely or there is a clear operational gulf between the two.

Technology administration is site based as opposed to qualification or expertise based. For

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25. Exception: TM, JD, FD

26. Attachments > "JSD-TechJobDescriptions.pdf"

27. Two of the site technicians were not interviewed due to being on extended leave. Their roles in the school surmised by interviews with teachers and principals.

example, instead of a qualified technician in a central location managing all district wireless access points, copiers, or printers (technically possible), each site manages its own with varying configurations and success.[28]

Within District IT, responsibilities for various mission critical services are distributed but all members share user support tasks.

During the course of interviews with fellow school districts, the average ratio of site technicians per-student is 1-to-500. In the district that ratio is 1.7-to-500, yet staff generally feel under supported and tech staff overwhelmed. The composition of the operations and support mechanism in the district makes it impossible to implement standardized configurations that would enable time saving automation and remote administration.

The district IT department relies heavily on subcontracting to fulfill its mandate. For FY09, over $80,000 was spent subcontracting network administration labor tasks.[29] A separate contractor was used for website and database development.

Network Design & Function

The general network topology as well as educational services infrastructure is built reactive to classroom needs. Four years ago the Wide Area Network operated at "T1" speeds: 1.5 Mbps. Internet was provided by two cable modems.[30] At the time no plan existed to scale the network according to predictable industry and educational needs, so instead of changes occurring as part of an educationally-founded design, they were made reactively after District IT received enough reports that current bandwidth was unacceptable.

Because there was no plan in place to scale the network, when schools required more bandwidth the simple solution was to add more Internet cable modems. At the time this decision made sense, but over time the design approach has not changed. Instead of growing towards a strong sustainable network, today the district has an overly complex, unwieldy topology that is hard to manage and impossible to provide Quality of Service (QoS).

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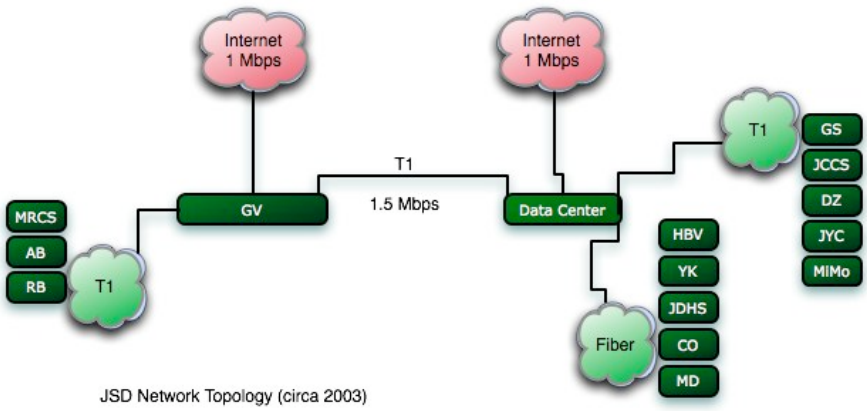
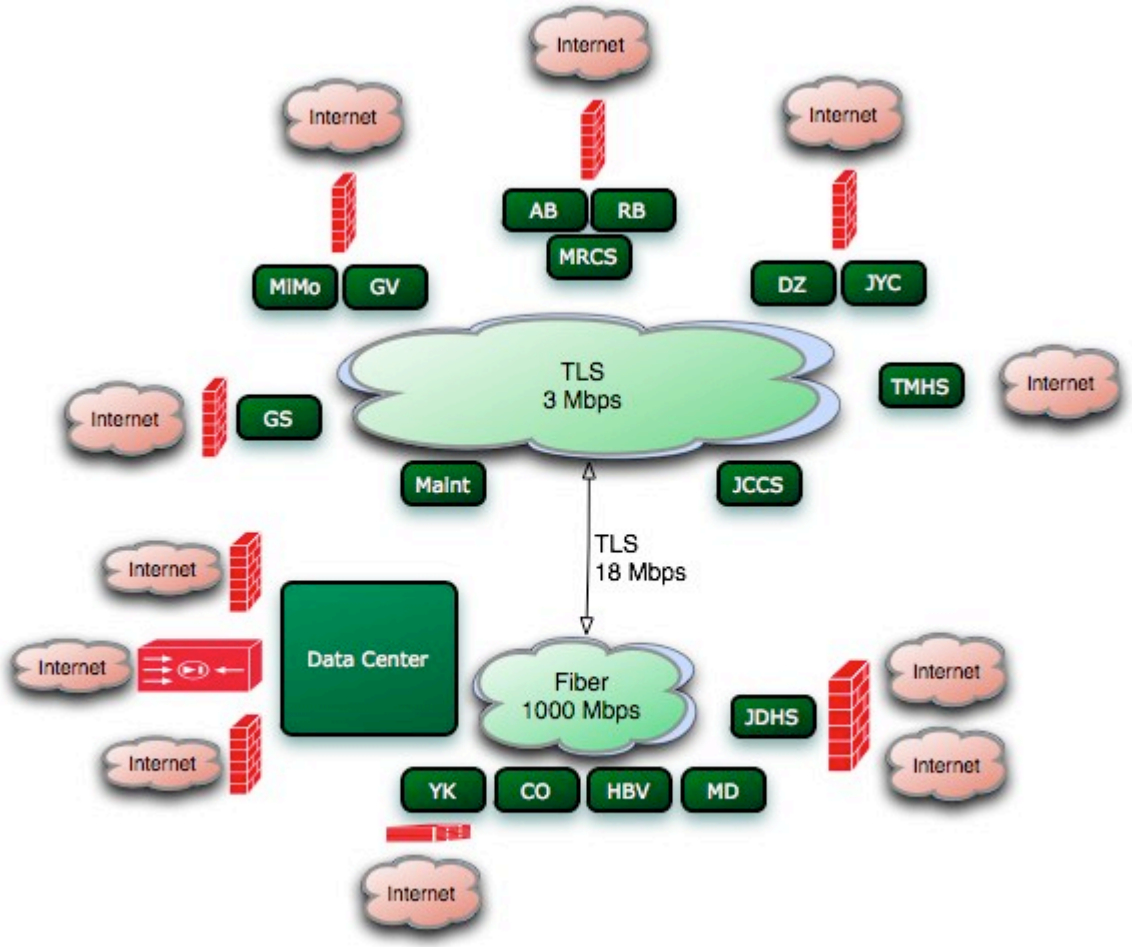
28. A handful of exceptions exist, including the new wireless systems installed in TMHS and JDHS, maintenance of which is subcontracted to Jeffus & Williams.

29. $48,000 of which went to configuring the network at TMHS.

30. Source: Brian Duncan, Jeffus & Williams



JSD Network Topology (circa 2003)



JSD Network Topology (Current: 2008)

Maintaining the current network requires administering multiple firewalls and content filters.

Internet access in general is unsatisfactory. The cable modem platform in Juneau is an asynchronous residential service, meaning the schools share a "pipe" with other residents of the neighborhood. Further, the asynchronous nature of the bandwidth is suitable for small offices or households, not large organizations.

The district IT department maintains twelve network firewalls with built-in content filters for traffic transitioning from WAN to internet. Due to the distribution of cable modems, there is no single point of content filtering. Instead, the design of the topology determines which firewall a school uses to get to the Internet. The result is significant overhead for technicians and an overall lack of flexibility and control. For example, students in JYC get to the Internet through the firewall at DZ. This means any site opened for DZ is also opened for JYC. Similarly, as the diagram above shows, the secondary students at MiMo get to the internet through the GV firewall.

The cost of cable modems is inexpensive compared to a single, synchronous, dedicated internet connection. However they require more labor to maintain, have no option for QoS, and are more difficult to troubleshoot. District IT makes creative attempts to squeeze ideal performance out of the cablem modem platform which are costly, may not provide adequate return on investment, and do not serve a long-term plan.

The WAN is driven by technology similar to cable modems called Transparent LAN Service (TLS). TLS is a "subscription level" service, meaning the bandwidth is shared by subscribers. Currently the Juneau TLS network is under subscribed, so performance is unaffected by congestion. Comparatively, the Anchorage TLS network is over-subscribed and during peak hours performance degradation is noticeable. As more businesses in Juneau use TLS for their WANs, performance for the district may decrease.

TLS is theoretically transparent, but network staff have noticed that in order to successfully route telephone traffic over the IP WAN, special tunneling workarounds were required. the district currently has no WAN-wide QoS or VLAN that allows for comprehensive service delivery of voice and video traffic, nor is there any plan or existing research on how to deploy such services.

With the exception of the downtown campus, TLS is delivered to schools using "bonded copper," rather than fiber optics. This limits the speed at about 3Mbps. Both ACS and GCI express that if requested, and if a business case exists, they would install fiber optics to the various schools.

The data center in Marie Drake has a fiber optic TLS connection running at 18Mbps.

Each school has its own Cisco router that routes traffic either out to the internet or through the WAN. All traffic destinations are controlled via "static routes" rather than dynamic gateways. Static routes provide a greater degree of traffic control, but are not sustainable in the district due to their complexity.

Server Core Design & Function

The server core reflects a similar lack of planning as many other technology areas across the district. Rather than grouping services per physical server machine by type or specification, separate physical servers exist for each discrete network service. The end result is many servers not being used to potential, large unrealized expenditures over the years, and bloated maintenance overhead. Of the 28 servers in the server room, nearly all are dedicated to a single service. While some services require their own dedicated operating system, most are technically compatible and can coexist.

The disparate nature of the district's servers indicates lack of planning towards more effective and powerful infrastructure solutions like Virtual Machines (VM), Storage Area Networks (SAN), and Network Attached Storage (NAS).

Backups of mission critical data are handled in a variety of ways, rather than with one unified solution. Some servers are backed up using tape drives, others have attached external hard drives, whereas others share backup media over the network. Similarly, versions and manufacture of backup software vary significantly.

In general, mission critical data in the data center is backed up, but verification of the backups and processes to restore are complex and untested. Because there are so many backup mediums, there is no option for regular/automated off site data storage. If disaster struck the data center in Marie Drake, the following data would be lost: All user email not downloaded to individual computers, all school websites, all software installers, JDHS file server, Harborview file server, various historic assessment and other student data files, Alio business system, downtown campus SuccessMaker, Destiny library check-out, Powerschool student information system, all backups of historic file and student data, Open Directory including all user accounts, and innumerable various server and network configurations.

Web Services

the district does not have a modern web publishing platform available for teachers and students other than the traditional method of creating "static" web pages.[31] The techniques and tools taught to teachers and staff on web-based content disseminatation do not reflect modern trends in the greater educational or business community. A large amount of money and effort has and are still being spent training staff to use tools that are not applicable to modern web-based delivery.

the district's current public-facing website is a static collection of discrete web pages made to look similar with the use of templates; there is no connection other than "look". There is no integrated web platform or content management system driven dynamically by a database.

Staff use tools such as Adobe Contribute and Dreamweaver to edit entire pages and then upload them to the district's web server. Students use similar programs to do the same for their individual websites. This has created a common understanding across the district for how to

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31. Exception: the Floyd Dryden website is a dynamic solution built by the technology teacher.

update web pages that is contrary to the way modern websites operate. Instead of only updating particular pieces of content, staff are updating entire pages at a time and introducing an unnecessary degree of user error that can result in broken, discontinuous pages. The time and skill required to update web pages in the district's current web paradigm are significantly higher than when using integrated "content management systems." More importantly is the overall conception that web based delivery in the district is misguided. Further, the lack of a modern web service infrastructure prevents teachers from integrating online collaboration into their curriculum.

Documentation

When District IT was asked to provide network documentation two documents were delivered. One, a slightly outdated topology diagram and the other a list of servers.[32] No other network documentation exists.

From these documents, onsite reviews, and network tests, our team developed a network topology spreadsheet which includes all core device IP addresses, points of egress, and servers including those not managed by District IT.[33] We also constructed an updated topology diagram (shown in the *Network & Topology* section above).

When asked for samples of historic proposals, infrastructure plans, budgets, network design concepts, and other similar documents our team was told by District IT that "there are none".[34]

Neither District IT staff nor site technicians maintain continuous documentation for the following:

- Passwords;
- Standardized device configurations;
- Server configurations;
- Network routing tables;
- Software inventory;
- Software license codes;
- Software license inventory;
- Computer or device inventory;
- Procedures for technology checkout.

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32. Attachments > "JSD Servers.xls"

33. Attachments > "JSD TechRR NetMap.xls" (Note: in the interests of network security this item is not included in report attachments but sent directly to IT Supervisor.

34. Supposition: new IT leadership wants to "start from scratch".

While a process exists for tagging of technology assets, there is no system for the tracking or logging of devices. The process that equipment takes after purchase is as follows:

1. Item arrives at the maintenance office;
2. Item is tagged and written on with permanent marker denoting it's tag number and grant (if applicable);
3. Item is entered into the fixed asset inventory system;
4. Item is delivered to final destination (either directly to the staff who ordered it or to District IT where the item gets configured before final delivery).

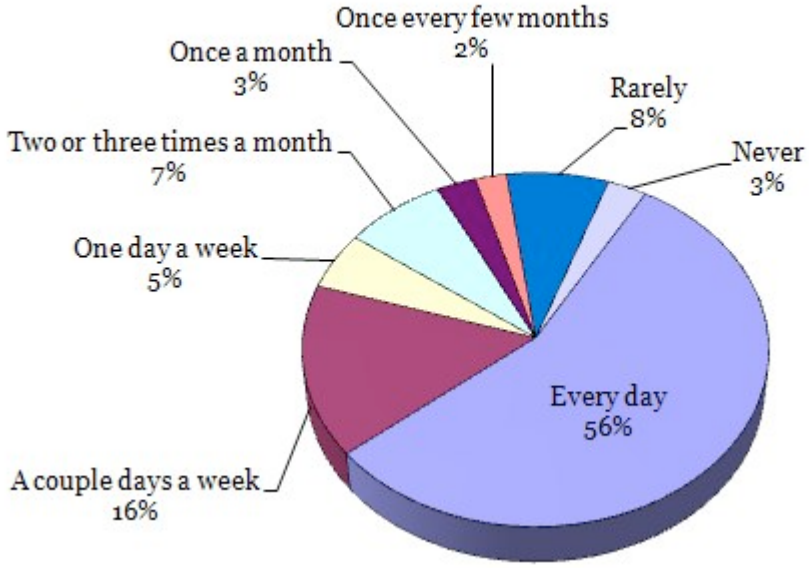
When asked for a report[35] from the existing fixed asset management system for any technology related categories, it became clear that when items were entered, they were not categorized correctly. The entire history of the *Instructional Computers* category consists of twelve items totaling $60,219, for the time period 1994 through 2001. No entries later than 2001 exist. For the category *Networking Equipment* the list is a bit longer: 53 items, most of which are servers.

Documentation of per site technology is administered by the site technicians and varies greatly depending on the technician.

Infrastructure Budgeting

A survey of district administration staff shows just how vital computers are to the organization:

How frequently do you use computers to accomplish your work?



There is no dedicated budget for replacing computers, printers, software, or other mission critical technology on a recurring basis. Computer replenishment happens reactively after something breaks or starts making "loud grinding noises" rather than in a preventative manner.

35. Attachments> "11-25-08 Asset Category 141 151.pdf"

If a teacher who is not part of a grant has technology that needs replacing, she typically has to wait until the next building renovation. School operating budgets are too small to treat computers the same way they do pencils and paper.[36]

Infrastructure Assessment By Site

During assessments, a number of issues not noted above became apparent. The following bullets detail infrastructure issues per site.

District wide:

- No internal firewalls segregating traffic from various sites;
- SSH (command line interface) access from outside the WAN is open through all egress firewalls;
- All ports and traffic are open internally from one site to another (i.e. from JYC to Maintenance);
- No Windows infrastructure for remote administration, software deployment, antivirus, security updates, and user/group security policies;
- Security group distribution for user logon and email accounts is insecure: site technicians can reset passwords and adjust user groups for any site.

Marie Drake Data Center (MDDC):

- Security camera is not motion sensor enabled and doesn't record;
- UPS is not integrated for all servers, doesn't gracefully shut-down units during a power outage;
- Backups are insufficient, do not cover all mission critical data, and do not include off-site storage.

Gastineau Elementary (GS):

- Network closet is too small and is used for storage of non-server/network items;
- Rack mount server is sitting on a table instead of mounted in a rack;
- Wireless is unencrypted and configurations are inconsistent;
- Ethernet switches are 10mbit;
- UPS batteries are dead;
- No off site file server backup.

Dzantik'i Heeni (DZ):

- Media lab is outdated;
- Rack mount server is sitting on a table instead of mounted in a rack;
- Wireless is unencrypted and configurations are inconsistent;
- UPS batteries are dead;
- No off site file server backup.

Riverbend (RB):

- Ethernet switches are 10mbit;
- Rack mount server is sitting on a table instead of mounted in a rack;
- Wireless is unencrypted and configurations are inconsistent;

36. On average, 30% of building budgets are consumed by copy machine costs.

- UPS batteries are dead;
- No off site file server backup.

Harborview (HBV):
- Library computers are outdated;
- Wireless is unencrypted and configurations are inconsistent;
- Montessori computers aren't bound to Open Directory.

Thunder Mountain (TM):
- No off site file server backup;
- No classroom audio output for podcasting;
- Classroom sound system doesn't work unless projector is turned on;
- No off site file server backup.

Auk Bay (AB):
- Ethernet switches are 10mbit;
- Server closet is too small;
- Wireless is unencrypted and configurations are inconsistent;
- UPS batteries are dead;
- No off site file server backup.

Mendenhall River (MR):
- Montessori computers aren't bound to Open Directory;
- Rack mount server is sitting on a table instead of mounted in a rack;
- Wireless is unencrypted and configurations are inconsistent;
- UPS batteries are dead;
- No off site file server backup.

Miller House / Montana Creek (MiMo):
- No local file server;
- No dedicated content filter for restricted students;
- UPS batteries are dead.
- No off site file server backup.

Johnson Youth Center (JYC):
- No specialized computer security for restricted students (ie: keylogger or custom content filter);
- No segregation from the rest of the district network;
- No off site file server backup.

Floyd Dryden (FD):
- Not enough lab time for classes;
- Server is non-RAID;
- Wireless is unencrypted and configurations are inconsistent;
- UPS batteries are dead;
- No off site file server backup.

Juneau Douglas (JD):
- Old wireless network is left in place after new network was installed;

- No network storage for video;
- Desktop computer administration isn't automated;
- No off site file server backup.

Glacier Valley (GV):

- Mobile laptops are out-dated;
- Wireless is unencrypted and configurations are inconsistent;
- UPS batteries are dead;
- No off site file server backup.

Yakoosge (YK):

- No dedicated technology support for 1:1 laptop maintenance;
- Wireless is unencrypted and configurations are inconsistent;
- UPS batteries are dead.
- No off site file server backup.

Juneau Community Charter (JC):

- No local file server;
- Server room is a janitor closet;
- UPS batteries are dead;
- No off site file server backup.

Maintenance (Maint):

- Keyless access server is non-RAID;
- Keyless access server has no attached backup;
- Wireless is unencrypted and configurations are inconsistent;
- UPS batteries are dead;
- No off site file server backup.

District Office (DO)

- Wireless is unencrypted and configurations are inconsistent.
- UPS batteries are dead;
- No off site file server backup.

Recommendations

Organizational: Technology Coordinator

Recommendation 1.1.1: Hire a full-time Technology Coordinator

A school district of this size requires a dedicated person who understands both the complex technical infrastructure as well as classroom realities regarding educational technology. Expenditures for costly technology devices need to be "on vision" and contribute to the overall direction of the district's educational goals. Classroom teachers need to have direct access to consistent coaching on technology integrated lessons from someone who can prioritize technology not only in concept but with organizational authority.

The Technology Coordinator's job is to ensure that both infrastructure services and classroom practices are coordinated and successful.[37] This position is an educational technologist at heart, attentive to "what's next", but well-versed in the realities of classroom success and pedagogy.

The Technology Coordinator facilitates the process of defining the role of technology across the district. Without coordination at this level, teacher efforts at integration are splintered and unrealized. In this age of information and computer technology the district not only needs a well defined path but a person who owns that vision and is accountable for its implementation.

Key job duties and qualifications of the Technology Coordinator include:

- Oversee all technology infrastructure, support, and professional development staff and activities;
- Facilitate the definition and implementation of the district's strategic technology vision for both infrastructure and integration;
- Work to ensure all staff have proper training and support so they can meet integration expectations and become more creative with technology in their lessons;
- Work with grant and program administrators to pursue and develop "vision-aligned" technology solutions, submit proposals, monitor progress, and assist with reporting and program evaluation;
- Advanced understanding of modern network and server technologies, platforms, operational capacities, and compatibilities;
- Advanced understanding of modern operating systems, application software, and the internet;
- Advanced understanding of classroom, school, and district technology management and maintenance;
- Advanced understanding of educational technology integration techniques and current research-based best practices;
- Ability to manage state of Alaska educational technology planning requirements for E-Rate and Title IID;
- Understanding of district curriculum guides and pedagogy for technology integration at all grade levels;

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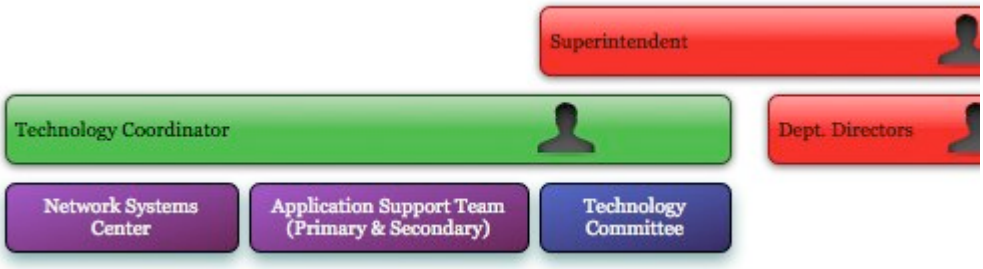
37. Appendix B: Recommended Job Descriptions

The Technology Coordinator will directly manage all district technology infrastructure, support, and training staff, as well as facilitate the district technology committee. A partial organizational chart below shows the relation of the Technology Coordinator to fellow managers:



Organizational: Network Systems Center

Recommendation 1.2.1: Redefine the district's IT department, creating the Network Systems Center

Currently all technical support is handled by either the per site computer technician or District IT. The definition between training and application support is unclear, as is the boundary between infrastructure technology and application software. the district's network and server requirements are vital and complex enough that dedicated expert staff are required. To address this and design a platform for flexible growth, the district IT department should be separated into a Network Systems Center to handle mission critical infrastructure, and an Application Support Team to handle user support and training: both units managed by the Technology Coordinator.

The Network Systems Center (NSC), headed by the Network Systems Supervisor, is a small but expert team dedicated to maintaining network and server infrastructure.

NSC staff are specialized experts in their particular field, and as such it is important they maintain proficiency in their particular domains.[38] To that end regular evaluations should be performed by qualified managers who can gauge technology skills, capacity, and job performance.

The NSC, while tasked with maintaining mission critical infrastructure, is not tasked with defining it. Decisions that affect classroom tools should be made in collaboration with educators. This includes services like email, desktop software, Internet content filter, and web services. The NSC must be included in design discussions to verify compatibility, but decisions as to application and type of tools to employ are to be made by the technology committee with executive direction of the Technology Coordinator.

38. Appendix B: Recommended Job Descriptions

Overall duties of the NSC include:

- Maintain LAN and WAN physical and wireless networks;
- Design and maintain network and server security;
- Maintain all physical servers;
- Maintain mission critical network services (email, web, file, directory, print);
- Maintain data center hardware and software;
- Design and implement infrastructure technology solutions;
- Provide escalated technology support.

Organizational: Application Support Team

Recommendation 1.3.1: Redefine the district's IT department creating the Application Support Team

The current district model aims to provide technology support and training but is inefficient and prohibits proper coordination. In addition, the district does not make use of modern methods for maintaining technology and providing support.

A small number of centrally managed technicians can provide better customer service for lower cost than a large number of uncoordinated technicians.[39]

The Application Support Team (AST) is a mixed group of technicians and educational technologists, supervised by the Technology Coordinator. This group is focused on customer service and is tasked with providing direct technology support for all schools, as well as all integration and technology professional development. Within the AST two Application Support Teachers provide specialized integration support for elementary and secondary.

Overall duties[40] of the AST include:

- Develop and co-teach content specific units teaching students and teachers how to better use the tools available in non-technology content areas;
- Develop and implement standardized systems for desktop/laptop computer imaging, deployment, and technology administration;
- Provide "just in time" district wide operating system, application, and website support and training using remote administration software, instant message, and telephone;
- Provide regularly scheduled site visits for support and co-teaching;
- Manage documentation systems for standardization and tracking of passwords, software licenses, technology inventory, customer service help-desk, and peer support knowledge base;
- Develop and deliver content specific professional development and workshops;

Staff across the district needing technical support will use a variety of methods to submit a trouble ticket. Tickets are handled by available AST staff, and more often than not resolved immediately.

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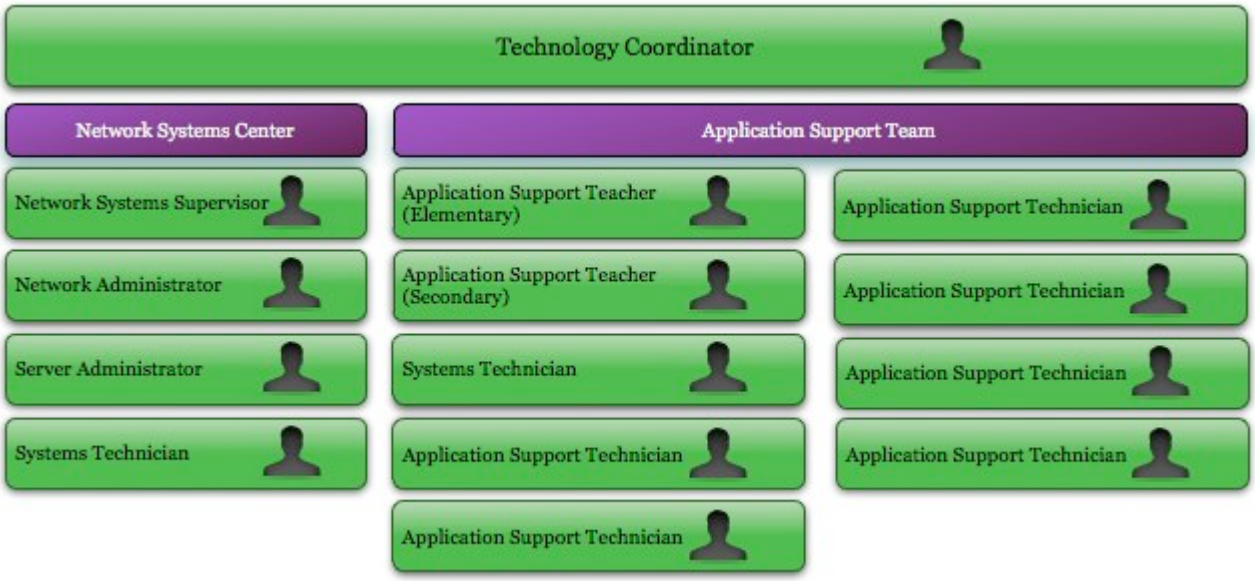
39. Case in point: The Kent County School District removed 40 per-school technicians and replaced them with 12 centralized technicians, and can statistically show that teachers receive better, faster service, and technology district wide is more functional and more integrated.

40. Appendix B: Recommended Job Descriptions

Critical issues that can not be immediately resolved using screen sharing or remote access tools will result in dispatching a technician. Issues of a non-critical nature that can not be resolved remotely will be resolved during regularly scheduled visits to each school.

The AST will function as a highly effective call center with a focus on customer service and results. All resolved tickets will have a customer feedback form attached, to gather data about the quality of issue resolution.

Following is a recommended organizational chart for all technology groups:



Recommendation 1.3.2: Increase elementary librarian capacity in regards to technology integration

The half time elementary librarians are used chiefly to give teachers a prep period but do not consistently assist with the delivery of technology integrated lessons. By increasing schedules from half time to full time and providing proper professional development, librarians will become an asset in the school to help teachers integrate information technology.

Recommendation 1.3.3: Define a middle and high school Technology Integration Leader

Each middle and high school should have one technology teacher defined as the *Technology Integration Leader*. This position will require 30-60 minutes per week and will serve as a school level Technology Coordinator.

Integration: Technology Standards

Recommendation 2.1.1: Update district technology standards and provide coordination for consistent integration

the district's technology standards do not reflect current technology skills required by today's or tomorrow's workplace. The current standards are not adopted by teachers or school leaders. the district should modernize its standards or adopt the National Educational Technology Standards for students, teachers, and administrators.[41]

Once adopted, the standards should be integrated into the district's core curriculum.

In addition to providing "front line" technology support, the AST will, at the direction of the Technology Coordinator, facilitate all technology integration and training across the district. In elementary schools the AST will develop and deliver integrated lessons in fundamental computer tools: word processing, Internet skills, and digital media, as well as content-specific lessons in math, reading, writing, language, and general studies. Through co-teaching and curricular development, the AST will ensure that teachers are trained and equipped with lessons that demonstrate fundamental, best practice techniques.

Infrastructure: Documentation

Recommendation 3.5.1: Deploy a knowledge base that users can contribute to.

If the information age has shown us anything its the power of online community. Groups of users, through asynchronous collaboration, can provide a historic and ever evolving resource of questions, answers, and techniques. By employing a web based knowledge base the district will begin to harness and build its own online community.

Recommendation 3.5.2: Develop documentation systems for all infrastructure technology

Of critical priority for the newly commissioned AST will be the proper documentation of the following:

- Passwords;
- Standardized device configurations;
- Server configurations;
- Network routing tables;
- Software license inventory;
- Software license codes;
- Computer, device, and software inventory;
- Procedures for technology checkout.

Without adequate records, the district is dependent on individuals to remember key information.

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41. Source: http://www.iste.org/NETS

The inventory database included in this report should be extended by the AST to include particular specifications of devices including: serial number, memory, IP address, host name, location, maintenance notes, configuration details, and other information necessary for maintenance and support. A properly maintained inventory is essential and will allow easy export of a list of technology to decommission.

Infrastructure: Budget and Replacement Cycle

Recommendation 3.3.1: Define the supported technology list

Current technology support staff have little input into the applications and tools used in the classroom. They are generally required to support anything. While it is important to preserve the ability for teachers to creatively employ new tools, it is also organizationally important to define the scope and responsibility of technology support staff.

The first step in moving towards a sustainable technology system is to evaluate and standardize the hardware and software to supported by the district. This “supported technology list" will allow the district to properly budget for purchases and personnel time.

The list list should be evaluated regularly and amended by the technology committee. It should be detailed enough to include major software versions and specific hardware models. Technology requires expertise and resources to support, so any additions to the list may require an increase in AST staff time or talent. Items should only be added once the district has the ability to support them. Initially the list may contain:

Operating Systems	**Desktops**	**Laptops**	**Printers**
Windows 2003 Server Windows XP MacOS 10.4 and 10.5 MacOS 10.4 and 10.5 server	Apple iMac Intel Dell Dimension P4 Dell Optiplex P4 Apple Mac Pro Apple G4 Apple iMac G4	Dell Latitude P4 Apple MacBook Apple Macbook Pro Apple iBook G4 Dell Inspiron P4	HP LaserJet 4xxx, 2xxx

Fundamental Windows Software	**Fundamental Macintosh Software**
Microsoft Word 2003, 2007 Microsoft Excel 2003, 2007 Microsoft PowerPoint 2003, 2007 Microsoft Outlook 2003, 2007 Internet Explorer 7.x Firefox 2.x, 3.x	Microsoft Word 2004, 2008 Microsoft Excel 2004, 2008 Microsoft PowerPoint 2004, 2008 Microsoft Entourage 2004, 2008 Safari 3.x Firefox 2.x, 3.x

Classroom Software	Websites
Apple Remote Desktop 3.x iMovie ’08 iDVD ’08	District web based email District website and school web pages

While the AST is responsible for technology support it is also responsible for training. The supported technology list will help them separate support issues from training. Requests that require training, whether just-in-time or scheduled, will include helping teachers and staff learn how to use various tools outside of the supported list and may be prioritized below mission critical tasks.

Recommendation 3.3.2: Expand district wide infrastructure (NSC) budget

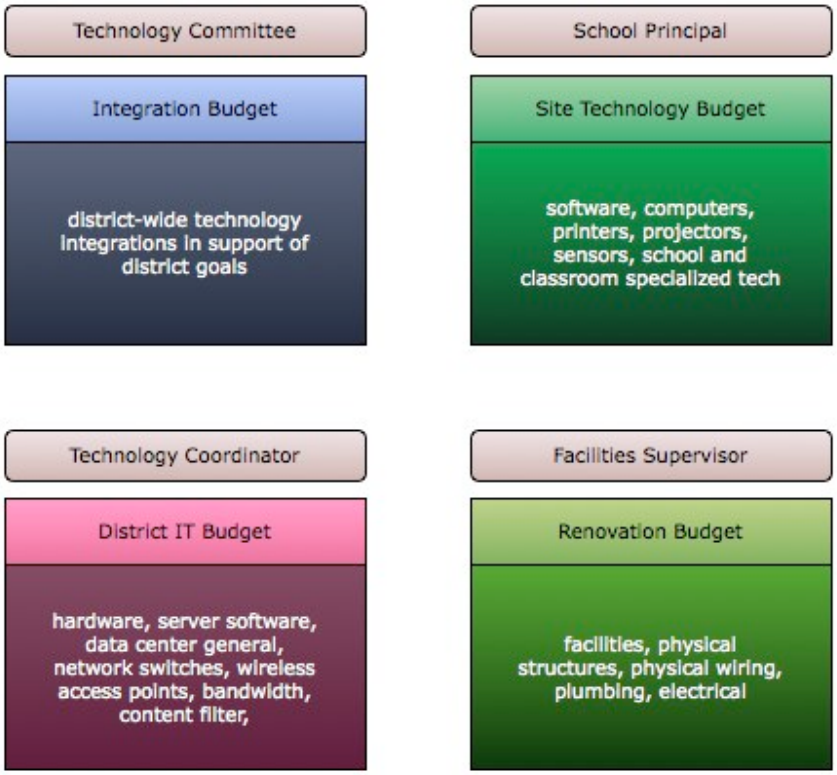
The yearly District IT budget currently covers the contents and software housed in the data center. This budget should be expanded to all technology managed by the NSC in all schools and district buildings including network switches, wireless access points, servers, and software.

Infrastructure items managed by the NSC should be verified to have lifetime warranty, replacement targeted by functionality or specification rather than age. For example, Nine year old network switches in some elementary schools are operating at 10mbit and without the ability to propagate secure VLANs, yet they are functional for core network activity. Additionally, it is unacceptable for mission critical devices of this sort to have any downtime, so at any time at least one identical replacement should be available.

Recommendation 3.3.3: Establish per school technology budget

Each school should be assigned it's own technology budget outside of the general textbook and supplies budget, based on student population and school programs. This budget should be used by the school to fund replacements of computers, printers, software, projectors, and other school or classroom technology. Purchases must adhere to the district technology purchasing policy and supported technology list.

The following illustrates technology related budgets and their purview:



Recommendation 3.3.4: Establish technology hardware replacement cycle

As schools hire additional staff or increase student population, technology purchases must coincide. A new staff member means an increase in resources required: desk, chair, computer. A successful technology replacement cycle will allow the district to budget long into the future, and ensure that non-compatible technology is cycled out of use before it causes problems.

The following table shows technology attrition rates and replacement costs based on current educational pricing and norms:

Item	**Years**	**Cost**
Macintosh Laptop	5	$1,300*
Windows Laptop	4	$1,200*
Macintosh Desktop	6	$1,500*

Windows Desktop	6	$900*
Workgroup Printer	6	$1,750*
Network Printer	4	$700*
Desktop Printer	2	$350*
Projector	4	$1,500*

*includes $100 software allowance for supported software, extra projector bulb, or extra toner.

Type	(Show	ll)											
Age Factor	7yo+	ecom)											
Sum of Qty	Site												
Assign	AB	DZ	GS	GV	HBV	Maint	MDDC	MiMo	RB	FD	JD	MR	Grand Total
Staff	12	1		3	7	11	0		6		19	3	62
Teacher	1	2	15		6		0	2	14	1	3	21	65
Student	48	100	20	29	43			7	36	87	161	24	555
Grand Total	61	103	35	32	56	11	0	9	56	88	183	48	682

When technology reaches a particular age, it should be scheduled for replacement. Based on the inventory database developed during this review, there are currently 682 computers in "decommission status".

For non-computer technology, the inventory system can be used to derive a list of to-decommission items:[42]

During each school's spring budget review, technology at decommission status should be evaluated for replacement in that following year's technology budget.

Age Factor	7yo+ (Decom)	
Assign	(Show All)	
Sum of Qty		
Site	Type	Total
AB	Copy Machine	1
	Network Device	2
	Other	2
	UPS	1
DZ	Digital Video Accessory	2
	Network Device	2
	Server	1
	Projector or Display	1
	UPS	1
GS	Digital Video Accessory	6
	Projector or Display	1
GV	Other	2
	Specialized Tech	13
HBV	Digital Video Accessory	1
	Document Camera	1
	Other	3
Maint	Network Device	1
	Server	1
	Other	4
MDDC	Network Device	2
	Server	5
	UPS	0
RB	Document Camera	1
	Network Device	29
	Other	16
	Specialized Tech	10
	UPS	2
FD	Digital Video Accessory	2
JD	Copy Machine	2
	Digital Video Accessory	2
MR	Copy Machine	1
	Document Camera	2
	Projector or Display	2
	Other	2
	Specialized Tech	10
Grand Total		134

42. Note: the inventory spreadsheet makes significant use of Microsoft Excel Pivot Tables.

Recommendation 3.3.5: Establish software upgrade cycle

Software doesn't wear down over time like physical hardware does, but new versions are released every year or two. By building software costs into a recurring technology budget the district ensures staff and students remain current.

For every new computer purchased, each school's yearly technology budget should include:

Operating System License	$50
Microsoft Office	$50
Total	*$100*

In addition, for every new computer, the NSC budget should include:

AntiVirus License	$25
Server Access License	$20
Content Filter License	$5
Email Filter License	$5
Total	*$55*

Integration: School Technology Committee

Recommendation 2.2.1: Formalize per-school technology committee membership

Each school should have a technology committee that meets at least once per quarter. The purpose of the committee should be to discuss ongoing integrations and infrastructure needs in the school. Meeting notes should be disseminated to the Technology Coordinator, and input taken from all school staff.

Membership of the committee should include the following personnel:

- Principal or Assistant Principal;
- School Technology Integration Leader;
- Two or three teachers and/or technology visionaries on staff;
- A representative from the AST.

Recommendation 2.2.2: Assign per school technology infrastructure budget to site technology committee

Once per school technology infrastructure budgets are developed they should be assigned to the school technology committee to execute purchases of equipment and software as defined by the replacement cycle.

Integration: Proposals and Solutions Development

Recommendation 2.3.1: Formalize the process for technology solutions development to include the Technology Coordinator

Lack of long-term infrastructure planning has a cumulative effect over the years, causing not only unrealized investments but an inflexible infrastructure that can't adapt to changing educational and technological trends. As the district decides to pursue various programs, grants, and initiatives, the Technology Coordinator should be included to verify that efforts are in line with long-term plans.

A policy should require outbound grant and program applications to pass through the Technology Coordinator for compatibility and overall educational technology coordination.

In a similar vein all technology purchases should pass through the office of the Technology Coordinator to ensure expenditures are part of the supported technology list, appropriate, and part of overall district strategy.

Integration: Classroom Alignment

Recommendation 2.4.1: Verify alignment of classroom lessons with technology standards

Definitive technology standards will set the district's vision, but actual lessons in content specific technology integration are where the rubber meets the road. The initial mandate of the AST, especially at elementary levels, will be the development of a core set of lessons designed to give students and teachers the fundamental skills needed to proceed into productive, modern academic environments. Word processing, internet research, online collaboration, and mixed media are the building blocks that will enable primary students to produce content and maximize their potential as they expand into secondary school work and eventually the marketplace of tomorrow. The Technology Coordinator and AST should work to verify district classrooms are employing lessons that enable them to meet the standards.

To verify classroom alignment with the district technology standards, teachers must identify exactly what training and curriculum development is needed at what levels and in which content areas.

Classrooms found to be out of alignment should be the focus of the AST, Librarian, and Technology Integration Leader. Co-teaching and lessons developed by AST teachers specifically for those classrooms will enable teachers to successfully adapt their curriculum.

Integration: Integration Budget

Recommendation 2.5.1: Establish a sustainable district wide budget to support qualifying technology integrations

The Technology Coordinator and by extension the technology committee should maintain and manage a technology integration budget used for supporting integration across the district. Teachers with a need for integration tools can submit proposals to the committee for funding or solutions development. A technology committee with the ability to fund projects will enable the district to leverage one of its strongest assets: teachers and their creativity. By implementing such a vehicle integrations can occur from the bottom up based on first hand assessments of what will succeed in the classroom.

Based on current integration in the district a yearly amount of $35,000 is a sufficient starting point.

Various funding sources can be used for this budget, but the following criteria must be met:

- Must roll over from year to year;
- Must not be attached to any particular school or program;
- Expenditures must be planned yearly;
- Expenditures must not be used to provide "reactive" support;
- Expenditures must not be used for infrastructure technology.

Recommendation 2.5.2: Assign the technology integration budget to the Technology Coordinator

As the central authority on all technology integration district wide, the Technology Coordinator will manage the integration budget. With democratic collaboration from the technology committee and district leadership, funds will be deployed to support and develop integrations that support overall district goals and long-term vision.[43]

Integration: Grade/Content Particular

Recommendation 2.6.1: Mobile labs in upper elementary schools

The Glacier Valley elementary serves as an example of how successful a group of classrooms can be when sharing a mobile laptop lab.[44] Provided the technology is configured and maintained properly, the resource gives classrooms the full power of internet research, project development, and production without having to relocate students to a separate room. Elementary technology budgets should strive to provide a mobile laptop lab for sharing between fourth and fifth grade classrooms.

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43. Attachments > "JSD-Board Goals 2008 - 2013.pdf"
44. Attachments > AYP Worksheet. Note: Correlation between technology integration and assessment scores was not assessed in this project.

Recommendation 2.6.2: New or Renovation Construction

During new or renovation construction the Technology Coordinator and NSC/AST should be heavily involved to design and verify educational specifications and implementation of planned improvements.

Recommendation 2.6.3: Podcasting in Thunder Mountain

With a few adjustments the classrooms in Thunder Mountain could be configured to allow teachers to easily record audio of their lessons. They already have microphones which are wired into each room's sound system. Ports on the wall allow teachers to plug audio/video in to, but not out of the system. By installing audio output ports in the same wall plates teachers could push "record" on their computer, deliver a lesson, push "save", and drag and drop the audio file to a server. Students and staff would then have historic access to streaming lessons from their own computers or handhelds.

Recommendation 2.6.4: Handhelds instead of computers

Teachers are more and more finding it difficult to maintain students' attention. Technology savvy students are having to "power down" when they come to school.[45] The reason is that the technologies students find interesting and are familiar with are not embraced by the district.

> "Today's students are no longer the people our educational system was designed to teach... They have spent their entire lives surrounded by and using computers, videogames, digital music players, video cams, cell phones, and all the other toys and tools of the digital age"[46]

Students are already proficient with handheld devices like iPods, so it stands to reason that teachers seeking to connect with them should deliver content in that medium. In the middle and high schools the district should consider using iPods in classrooms in lieu of computers or laptops for internet searching, streaming content, and collaboration.

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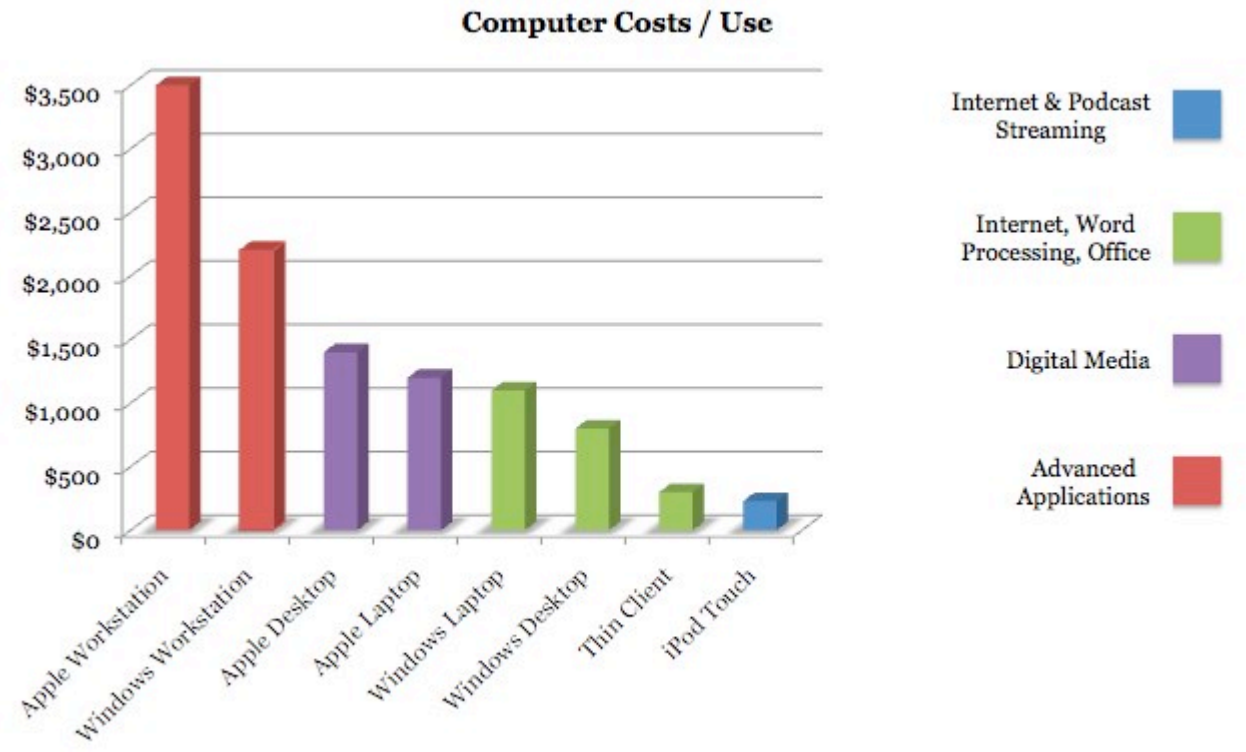
45. Source: Pay Attention

46. Source: Marc Prensky, Digital Natives, Digital Immigrants: http://is.gd/4fN2

Recommendation 2.6.5: Purchase appropriate technology

The following graphic shows the costs of typical technology and application.



The de facto computer purchased for nearly all applications in the district is an Apple desktop or laptop. Many applications don't require such an expensive computer and many of these machines are being used far below potential. Thirty iPods could provide a class with the ability to perform internet activities and online collaboration in a device already familiar and exciting for students, for a fraction of the cost.[47]

Similarly if a library or lab only needs to allow students internet access and word processing, an inexpensive thin client would do the same job as a full desktop computer.

Interactive white boards ("smart" boards) and wireless slates are used by teachers to control their computer by touching a large screen or handheld tablet. Many teachers prefer these devices because they free them from having to sit at the computer and enable them to share the controls with students. The software that accompanies such tools is extensive and powerful, but most teachers haven't figured it out and thus are using the technology below its potential. Instead, their use of the $4,000 interactive board remains at the most basic level, an effect that could be achieved by a $50 wireless mouse.

Before approval, technology purchases should be assessed by the Technology Coordinator, compared to the teacher and classroom, and if necessary different and more appropriate tools or techniques proposed.

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47. Thirty laptops = $39,000. Thirty iPods = $6,900.

Recommendation 2.6.6: Thunder Mountain Projectors

The projectors installed in each classroom in the new high school are network capable but there is no network wire run through the conduit to each projector. This simple addition will allow teachers to send presentations and content to the projectors over the network rather than having to plug their computers into the wall.

Additionally, the sound systems in each classroom require the projector to be turned on in order for audio to play on the room's speakers. This extra overhead confuses teachers and the wiring in each room should be modified so the sound system can be used independently of the projector.

Infrastructure: Network Topology & Design

Recommendation 3.1.1: Switch from multiple cable modems to a single, dedicated, point of internet egress

The current network topology prevents proper flexibility and growth. Cable modems are not sufficient for the district's internet needs, and multiple points of egress make proper content filtering time consuming and error prone. A single point of egress will reduce the amount of time and money required to administer the network, simplify overall topology design, and allow the district to deploy advanced content filtering solutions.

The cost increase from multiple cable modems to a single dedicated Internet connection is significant, but you get what you pay for. Currently the district pays about $45,000/year for Internet access. Pricing for the 1-3 year recommendation is estimated at $79,000/year, and the 3-5 year recommendation at $99,000.[48]

Recommendation 3.1.2: Upgrade WAN speeds for current and future predicted use

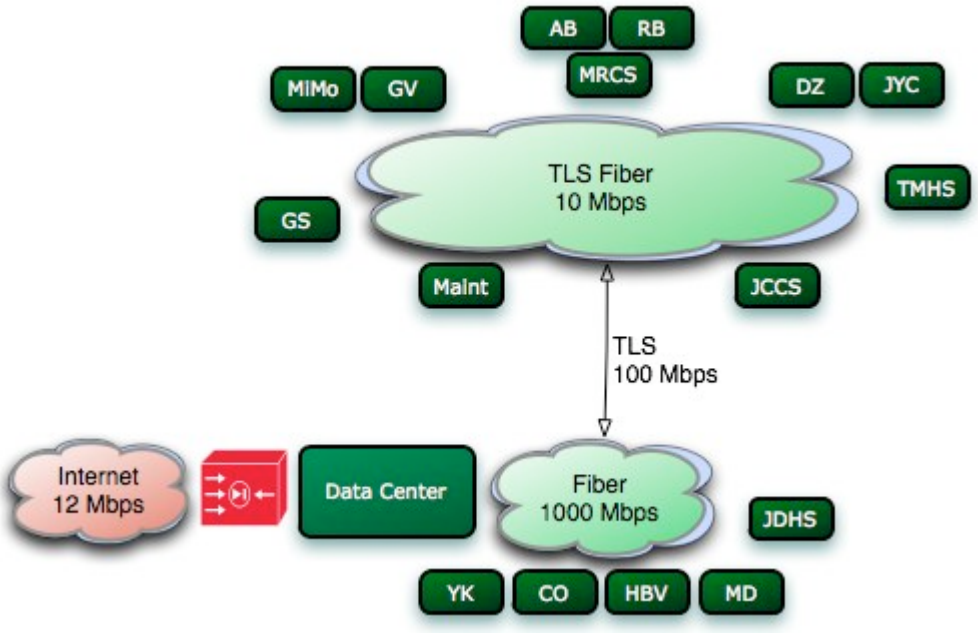
Current WAN speeds of 3mbit are not sufficient for centralizing servers, nor for routing traffic through a single internet connection.

The Juneau TLS platform is primarily copper based and brings with it limitations for future growth. In an ideal situation, some school districts have been able to install their own WAN infrastructure, either by way of microwave wireless or district/city owned fiber optics. In Juneau, the major telephone companies have already begun laying fiber optics in anticipation of winning contracts with the city's large, distributed businesses. Permits from the city to install wire in the right-of-way currently come with no stipulation for price or service discounts for city or public institutions. In other communities, such stipulations exist. The district, in conjunction with the City & Borough of Juneau, should work with telephone companies as well as Alaska Electrical Light and Power to investigate any potential for long-term bandwidth solutions that don't require large monthly fees.

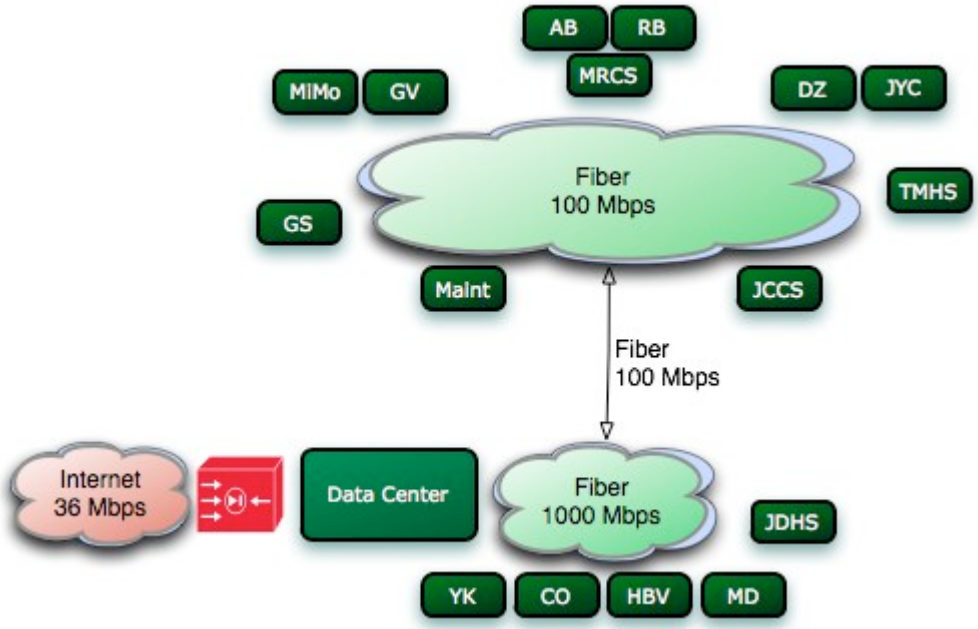
48. Appendix D: Bandwidth Costs Worksheet

The following network diagrams illustrate recommended network topology:

Recommended JSD network topology, 1-3 years:



Recommended JSD network topology, 3-5 years:



Recommendation 3.1.3: Upgrade all district infrastructure ethernet switches to 1000mbit, VLAN compatible, centrally managed.

The most powerful networks are driven by consistent technologies, often those provided by a single manufacturer. the district's infrastructure hardware currently is a mix of 3com and Cisco. While underlying technologies like VLAN and routing are standards based, the two products aren't able to be managed from a single point. A network consisting of mixed product types requires mixed methods for administration and maintenance.

By standardizing on one make, the district's infrastructure will cost less to maintain and configure.

Ethernet switches at the following sites were identified as incompatible and need to be replaced:

- Riverbend
- Gastineau
- Auk Bay
- Charter School
- Dzantik'i Heeni
- Mendenhall River
- Miller House / Montana Creek
- Maintenance

Recommendation 3.1.4: Design and plan for deployment a district wide wireless infrastructure

Wireless district wide is a non-standard mix without central control. The wireless network should be a direct extension of the ethernet network, supporting VLANs to allow for granular security and service separation (voice, video, data). JD and TM have new wireless installations based on 3com managed access points (MAPs) that are compatible, but vendor-selected rather than chosen for feature and interoperability. The Technology Coordinator and NSC should develop a long-term plan that includes make and model of wireless components district wide.

Requirements of the wireless infrastructure should be:

- Centrally managed (ability to configure district wide from one console);
- 802.11n capable;
- Complete building coverage;
- Integration with existing directory and user groups;
- Capable of hosting multiple SSIDs, visible and hidden.

Infrastructure: Web Services

Recommendation 3.2.1: Implement a modern "Web 2.0" capable web services infrastructure

To satisfy current communications needs, and to begin the process of integrating modern web technologies (aka "Web 2.0") into the classroom, the district must implement a modern web services infrastructure. Instead of a collection of discrete, hard-to-maintain static web pages; a

dynamic, network-integrated, database driven web services platform that allows for the publishing of various types of content by various users will allow the district proper control over dissemination and online community. This type of solution is known as a content management system (CMS) and will afford the following benefits:

- Staff no longer need to be trained to use complicated software like Contribute or Dreamweaver, just to navigate and edit content on the website itself;
- Save money on staff training and software licenses;
- Content and layout are separated, allowing regular users to work with content, and web-programmers to work with layout;
- Single webmaster role is replaced by a distributed group of content managers and various other groups with security permissions to edit or view only defined areas;
- Staff update individual pieces of content, not entire pages, which removes the risk of broken pages and inconsistent formatting;
- Content is stored in a database, not static HTML files, and thus is portable and can be accessed from other database-linked programs (FileMaker, Excel, Powerschool, Alio);
- Content can be moderated before it gets published to the world;
- Content can be automatically published/unpublised by predefined date/times;
- Lays the framework for deploying Web 2.0 technologies to the classrooms like wikis, blogs and micro blogs, online collaboration, electronic surveys, interactive knowledge base, social networking, instant message, and multimedia streaming;
- Helps establish a place to compile district- or school-wide knowledge base;
- Gives teachers and students a place to begin building online community.

There are many content management systems in the market, many made specifically for schools, others made more generally for web publishing. One CMS of note is Drupal, for the following reasons:

- Extensible, industry standard platform (PHP/SQL);
- No software license fees;
- Numerous "#1 Open Source CMS" awards;
- Large developer community;
- Large collection of freely-available modules (calendar, wiki, blog, profile, etc);
- Large collection of freely-available graphical themes;
- Excellent codebase and overall implementation design.

Some requirements of the web services infrastructure should be:

- Directory integration (LDAP, Active Directory, Open Directory);
- Very end-user friendly;
- "Distributed" system to allow storage of large files (video) on local servers;
- Multi-site and sub-theme capable;
- Granular access and authoring access controls (per-class, per-group, per-user);
- Extensible platform (can be extended to include more features, modules).

The cost for a Drupal or similar CMS is very low when compared to the features it offers. The software itself is free and the district already has the necessary hardware to host it. A subcontract with one of many Drupal theme developers will let the district re-implement it's current look/feel after a few days of work. Migrating content can be done by a various staff members, or via data-entry sub-contract.

The building of this infrastructure is the first step in integrating modern information technology into curriculum at all grade levels. With external websites that employ modern Web 2.0 technologies blocked by district firewalls, and with a strong need to be able to manage the content being published by staff and students, it is more important than ever that the district re-implement these types of tools inside the network, so that teachers may begin getting acquainted in a secure atmosphere. Without a viable web services platform that supports those tools, the district's teachers and students remain at stark disadvantage when competing in an ever increasing web-based world.

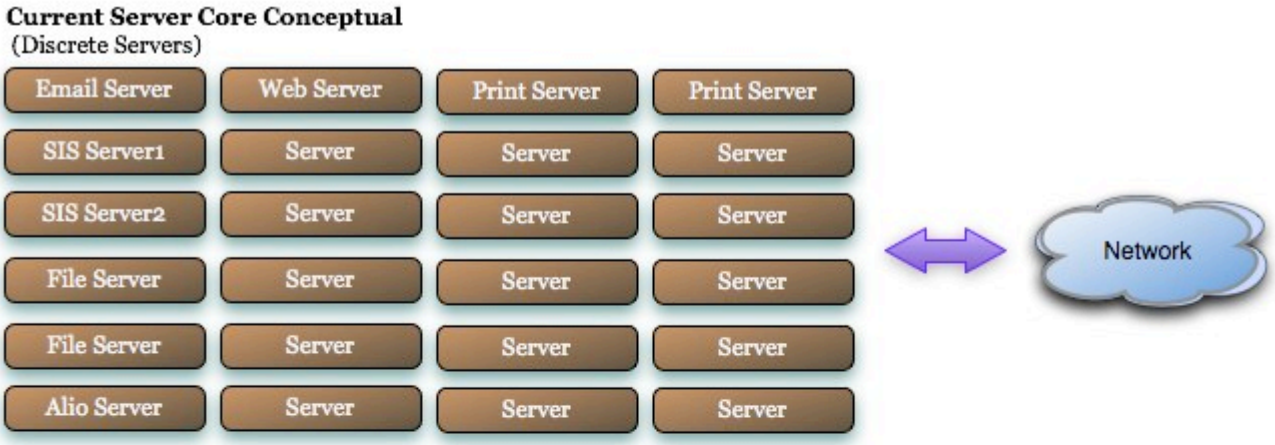
Infrastructure: Server Core

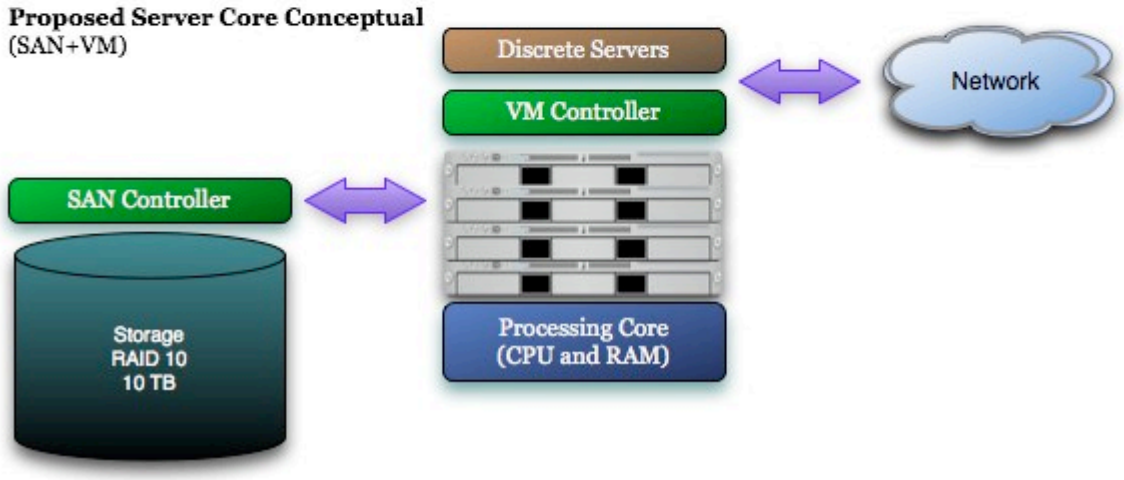
Recommendation 3.4.1: Design plans to migrate the server core to SAN/NAS/VM

Rather than a large number of discrete servers each providing a single service, the district should grow its server infrastructure towards a truly sustainable platform. By employing the use of Virtual Machines (VMs), servers can become portable irrespective of the hardware they're running on.

Further strengthening the server infrastructure, the migration of servers to a single SAN platform will allow for the provisioning of resources based on service requirement rather than the overall specifications of the physical machine. With a true SAN, a VM can be assigned a particular amount of RAM and disk space based on what that VM requires.

A conceptual comparison of current and recommended server core follows:





Recommendation 3.4.2: Design and implement a comprehensive UPS solution

A properly configured Uninterruptible Power Supply (UPS) in the data center will allow servers to stay on during short power outages, and will shutdown servers for longer outages. The current UPS solution does not allow this and should be modified to meet the following requirements:

- Central management;
- Cross platform;
- Graceful shutdown of all mission-critical devices.

Recommendation 3.4.3: Design and implement a comprehensive backup solution that includes secure off-site data storage.

Had a plan for a backup solution been in place prior to the renovation of Marie Drake it could have been purchased. The NSC should research and devise a detailed plan, including make and model of components and costs, for a sufficient backup solution.

The proximity of separate buildings in the downtown campus gives the district the ability to easily implement network based off site backup storage.

Requirements of the new system should be:

- Cross platform;
- Off site capable;
- Network capable.

The importance of adequate backups is such that the plan and associated budget should be presented at the beginning of every budget cycle, until it is funded.

Matrix of Milestones, Costs, and Outcomes

A detailed matrix of milestones to implement each recommendation can be found in *Attachments > "JSDTechRR Milestones Matrix.xlsx."* The matrix includes individual activities, costs, staffing, personnel/group assignment, and timeline for each recommendation.

Appendix

Appendix A: Components of Research

• Analysis of 178 20-question survey responses from teachers, staff, and administrators.

• Physical walk-throughs of every room in the school district including offices, classrooms, closets, and mechanical; photo-documenting and recording age, model, student/teacher assignment, and other observations of in-use technology. Locations toured include:

- District Office (DO);
- Marie Drake, currently functioning as Harbor View Elementary (HBV);
- Marie Drake Data Center (MDDC);
- District Information Technology Office (DO IT);
- Juneau Douglas High School (JD);
- Gastineau Elementary (GS);
- Dzantik'i Heeni Middle School Middle School (DZ);
- Glacier Valley Elementary (GV);
- Floyd Dryden Middle School (FD);

- Mendenhall River Community School (MR);
- Riverbend Learning Community (RB);
- Thunder Mountain High School (TM);
- Yakoosge Daakahidi and Homebridge Correspondance (YK and HBC);
- Auke Bay Elementary (AB);
- Juneau Community Charter School (JC);
- Miller House and Montana Creek (MiMo);
- Johnson Youth Center (JYC).

• Conversations with over 60 teachers, staff, administrators, parents, and students around the topics of:
- Classroom technology integration;
- Budgets, grants, and purchasing process;
- Professional development;
- Technology infrastructure solutions development;
- district wide long-term technology planning;
- Educational technology solutions development;
- Technology support and administration processes;
- General operational mechanics;
- General technology landscape and improvements.

• Conversations and information gathering from five vendors and solution providers regarding:
- Network design;
- WAN bandwidth;
- Internet bandwidth.

• Conversations and information gathering regard Areas of Inquiry from 12 comparable school districts both inside and outside of Alaska, regarding:
- Overall district demographics;
- Technology support models;
- Technology integration models;
- Network topology, bandwidth;
- Methods for professional development, solutions deployment;
- Methods for documentation, dissemination.

• Analyses of technology infrastructure elements including:
- Physical and logical network performance and configuration for all school LANs and district WAN;
- School LAN-hosted services;
- District WAN-hosted services;
- Internet-hosted Services;
- Desktop software;
- Desktop operation system and deployment;
- Curriculum-specific software;
- Email system and electronic communications;
- District technology infrastructure documentation;
- System-wide backups and disaster recovery.

• General research and information gathing including:

- Technology documentation;
- Proposals (past and in-process);
- Assessment information;
- School calendars;
- General demographics;
- Historic school board meeting agendas and minutes.

• Use-Case audits of the following integrations:
- Yakoosge 1:1 laptop program;
- FDMS video production;
- TMHS classroom audio/video systems.

Additionally, this document relies heavily on support materials gathered during research or developed during construction of the report. These numerous files are not print friendly and consist of hundreds of pages of spreadsheets, scans, and other information and can be found on the CD-ROM accompanying this document.

Appendix B: Recommended Job Descriptions

Technology Coordinator
Description: The Technology Coordinator is responsible for technology integration and overall technology leadership in the Juneau School District. Reports To: Superintendent or Associate Superintendent Position Requirements: • 5+ years experience in educational technology management; • Advanced understanding of network and server technologies, platforms, operational capacities and compatibilities; • Advanced understanding of modern operating systems, application software, and curriculum-use websites; • Advanced understanding of classroom, school, and district technology management and maintenance methods; • Knowledge and current research of educational technology integration techniques and current research-based best practices. Job Duties: • Manage the Network Systems Center and Application Support Team to coordinate all infrastructure, support, professional development, and technology integration activities; • Facilitate the coordination and definition of the district's strategic technology vision for both infrastructure and integration; • Ensure all staff have proper training and support so they can meet integration expectations and become more creative with technology in their lessons;

- Work with grant and program administrators to pursue and develop "vision-aligned" solutions, submit proposals, monitor progress, and assist with reporting and program evaluation;
- Manage state of Alaska educational technology planning requirements for E-Rate and Title IID.

Network Systems Supervisor

Description: The Network Systems Supervisor oversees all activities of the Network Systems Center (NSC). This position is responsible for keeping all mission critical network and server systems operational, at the design and direction of the Technology Coordinator.

Reports to: Technology Coordinator

Position Requirements:

- 5+ years experience in advanced network and server administration;
- 3+ years managing technology staff.

Job Duties:

- Supervise NSC staff and activities to ensure proper operation of infrastructure systems;
- Provide technology support to the Application Support Team;
- Collaborate with the Technology Coordinator and Application Support Team to design and implement technology solutions;
- Perform network administration duties as required;
- Perform server administration duties as required.

Network Administrator

Description: The Network Administrator is responsible for all network systems and configuration of switches, routers, firewalls, wireless, voice, video conferencing, and other core communications equipment.

Reports to: Technology Coordinator, via Network Systems Supervisor

Position Requirements:

- 3+ years experience in advanced network administration;
- Demonstrated ability to configure and manage WAN/LAN networks driven by 3Com and Cisco equipment.

Job Duties:

- Administer overall network design and topology;
- Implement and maintain VLAN and other network level configurations;
- Ensure network and Internet connectivity for all district sites and services;
- Provide technology support to the Application Support Team.

Server Administrator

Description: The Server Administrator is responsible for all server systems, configuration, and deployment of district services.

Reports to: Technology Coordinator, via Network Systems Supervisor

Position Requirements:

- 3+ years experience in advanced server administration;
- Demonstrated ability to manage and deploy Macintosh, Windows, and Unix/ Linux server-based systems.

Job Duties:

- Administer overall physical and logical server infrastructure;
- Implement new, and maintain existing, school services including email, web, file, print, directory, and others;
- Manage critical data backups, file security, and user/group policy design;
- Provide technology support to the Application Support Team.

Systems Technician

Description: The Systems Technician is an advanced technology support position that provides support for a broad range of technology and applications in school and classroom environments.

Reports to: Technology Coordinator

Position Requirements:

- 3+ years experience supporting advanced technology systems in an educational setting;
- Proficient in Macintosh and Windows operating systems;
- Demonstrated ability to effectively trouble-shoot complex applications and configurations.

Job Duties:

- Provide technology support and exemplary customer service.

Application Support Teacher

Description: The Application Support Teacher provides technology support and training, and develops and delivers technology integrated lessons to students and teachers.

Reports to: Technology Coordinator

Position Requirements:

- 3+ years experience teaching with a focus on primary and secondary cross-content technology integration;
- Ability to work with technicians, teachers, and adminstrators;
- Current Alaska teaching certificate.

Job Duties:

- Develop technology lessons for various content areas and grade levels;
- Co-teach and provide teacher support for developed lessons;
- Provide technology application support.

Application Support Technician

Description: The Application Support Technician provides technology support to teachers, students, and staff across the district.

Reports to: Technology Coordinator

Position Requirements:

- 2+ years experience providing technology support;
- Experience with Macintosh and Windows operating systems;
- Excellent customer service, communication, and record keeping skills.

Job Duties:

- Provide support to district staff and students as part of the Application Support Team.

Technology Integration Leader

Description: The Technology Integration Leader is an extra duty position for a teacher in a school who will assist fellow teachers with technology integration.

Reports to: Building Principal

Position Requirements:

- 2+ years experience teaching with a focus on technology integration;
- Ability to work with technicians, teachers, and administrators;
- Current Alaska teaching certificate.

Job Duties:

- Up to 1hr/week providing teacher and technology integration support.

Appendix D: Bandwidth Costs Worksheet

Bandwidth Cost Estimates Worksheet

Current

	Mbit	Cost	Qty	Monthly	After E-Rate
School WAN Link	3	$220	11	$2,420	$1,331
MDDC WAN Link	20	$900	1	$900	$495
TMHS WAN Link	3	$220	1	$220	$121
Internet	3	$150	12	$1,800	$990
Content Filter		$14	10	$138	$138
Maint/Labor		$60	12	$720	$720
			Monthly	***$6,198***	***$3,795***
			Yearly	***$74,370***	***$45,534***

Recommended (1-3yr)

	Mbit	Cost	Qty	Monthly	After E-Rate
School WAN Link	10	$450	11	$4,950	$2,723
MDDC WAN Link	100	$1,200	1	$1,200	$660
TMHS WAN Link	10	$450	1	$450	$248
Internet	12	$5,000	1	$5,000	$2,750
Content Filter		$180	1	$180	$180
Maint/Labor		$60	1	$60	$60
			Monthly	***$11,840***	***$6,620***
			Yearly	***$142,080***	***$79,440***

* Internet and content filter based on current AT&T pricing.

* WAN links based on current GCI TLS pricing.

* 3yr prices are provider-aggregated and reflect current pricing.

Recommended (3-5yr)

	Mbit	Cost	Qty	Monthly	After E-Rate
School WAN Link	100	$550	11	$6,050	$3,328
MDDC WAN Link	1000	$1,600	1	$1,600	$880
TMHS WAN Link	100	$550	1	$550	$303
Internet	20	$6,500	1	$6,500	$3,575
Content Filter		$180	1	$180	$180
Maint/Labor		$60	1	$60	$60
			Monthly	***$14,940***	***$8,325***
			Yearly	***$179,280***	***$99,900***

* 5yr prices are provider-aggregated and reflect typical market curve.

Appendix X: References

Website addresses listed below are case sensitive and shortened in some instances to make them easier to type.

JSD Curriculums (Standard and core): http://is.gd/eoxP
JSD Board of Education Minutes Archives FY08: http://is.gd/eoxL
JSD Board of Education Minutes: http://is.gd/eoxD
Project Lead The Way: http://www.pltw.org/index.cfm
Project Lead The Way, FAQ: http://www.pltw.org/Engineering/FAQs/FAQs.cfm
School Enrollment Totals for Alaskan Schools: http://eed.alaska.gov/stats
District Enrollment Totals for Alaskan School Districts: http://eed.alaska.gov/stats/
Create a Tech Replacement Cycle: http://is.gd/eoxz
ECASD Technology Plan: http://is.gd/eoxs
Using Drupal in Education: http://funnymonkey.com/drupaled-latest
Integration of Instructional Technology into Public Education: http://is.gd/eoxp (PDF)
Edutopia's Technology Integration Resources: http://www.edutopia.org/big-list-tech-integration
Middle School Technology Integration: http://jc-schools.net/tutorials/ms/
Selecting, Evaluating, Configuring Web Content Filters: http://is.gd/eoxk (PPT)
Marc Prensky - Digital Natives, Digital Immigrants: http://is.gd/4fN2 (PDF)
Marc Prensky - What Can You Learn From A Cell Phone: http://is.gd/eozj
Willard R. Daggett, Ed.D. - Successful Schools: From Research to Action Plans: http://is.gd/eox4 (PDF)
Pay Attention: http://is.gd/eoA1 (Slides), http://is.gd/eoAb (Video)
National Center for Education Statistics: http://nces.ed.gov/
David Warlick - Teaching and Learning on the Edge of Change (2006)
Transforming Teaching Through Technology: http://t4.jordandistrict.org/t4/
Larry Lessig - How Creativity is Being Strangled by The Law: http://is.gd/eDsk

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